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**PC  
MAGAZINE**

# *Data Security: PC Labs Tests 13 Tape Backup Systems*

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- We Review the 6 Top-Selling Project Managers
- HomeBase and DeskPlus Challenge SideKick

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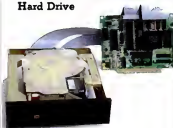
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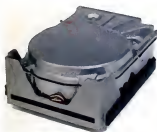
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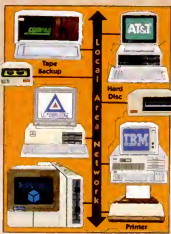
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## COVER STORY

### Tape Backup: Measuring Speed and Cost per Megabyte

**Bill Machrone!** As PC users install ever larger hard disks, the potential for incapacitating DLD (data loss depression)



keeps growing. But there is help: tape backup prevention. In this cover story evaluation of 13 standalone tape backup units, PC Magazine Labs gets down and dirty, testing them for the criteria that count most: speed, cost per backed-up megabyte of data, and the quality of software that makes them work. .... 106

### Tape Backup: Technologies In Competition

**Craig L. Stark!** All tape backup systems are not created equally. A look at the merits and liabilities of the three 1/2-inch standards competing for your attention in the tape backup marketplace. .... 140

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### SOFTWARE

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**Richard Aarons!** There are two kinds of people: those who like schedules and organization and those who don't. Many of the first type have taken to desktop utilities—cheap, handy memory-resident programs that help them stay on track. Two new ones, *HomeBase* and *PolyWindows DeskPlus*, sport spiffy enough features to outclass their first-generation competitor *SideKick*. .... 149

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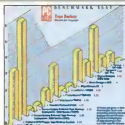
#### Live Market Quotes on Your PC

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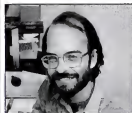
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Roberto Brosan

# WHAT'S INSIDE



When *PC Magazine* first decided to tackle tape backup, we had great expectations. Products from Alloy, Cipher, Genoa, Hewlett-Packard, Interface, Lintec, Maynard, Micro Design, Sigma Design, Sygen, and Tecmar sat ready and waiting to be tested in *PC Magazine* Labs. We hoped our findings would reveal lightning-fast speed, painless operation—in short, that these products would offer a simple means of copying the contents of a hard disk that would forever end the drudgery of this housekeeping chore.

Unfortunately, that wasn't what happened at all. We had barely uncrated and plugged in the units when the trouble began. The first several units out of the box simply did not work. As Bill Machrone recounts in his introduction, "We had to invest several man-days before we could determine that it was them, not us." To find out how the Labs finally got them up and running and how it evaluated their performance, turn to the lead article, "Tape Backup: Measuring Speed and Cost per Megabyte" on page 106.

Crazy as it sounds, nearly all the products tested are incompatible with one another. They use different media, different formats, and different file-handling techniques. Which approach is best? Each manufacturer, of course, believes its approach is best. Technical editor Craig L. Stark sorts out their claims in "Tape Backup: Technologies in Competition," page 140.

Meanwhile, as we slugged it out with the backup units, Alfred Poor and his partner Bruce Brown, of Soft Industries Inc., were managing *PC Magazine* projects in their Southington, Connecticut, offices. This in itself was not so unusual, but these projects had nothing to do with day-to-day business. They were hypothetical scenarios created by Poor and Brown to evaluate project management software. The duo put six of the top-selling project managers through a real-life business task and summed up the performance and features of each. For results, turn to page 155.

And there's more. Dick Aarons looks at *HomeBase* and *PolyWindows DeskPlus*, two desktop utilities that challenge *SideKick* (see "The Organizing Principle," on page 149). Speaking of utilities, don't overlook Charles Petzold's memory-resident DOS-EDIT utility in the Programming/Utilities column (page 217). One frustrating thing about DOS is that it recognizes just one line. Petzold's program frees up the cursor so that it's not trapped on one line at a time. This means that you can modify and reexecute old commands quickly and painlessly. Petzold's program, like Petzold himself (pictured above), is a real DOS tamer. ■

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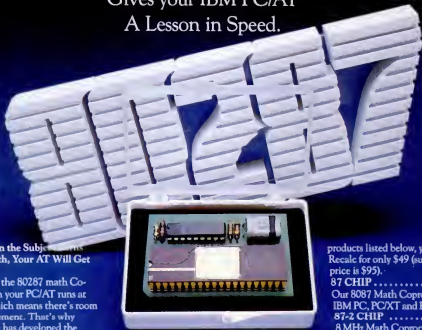
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*New York Times, Erik Sandberg-Diment—*When it comes to overall ease of use and efficiency, Pop-Up DeskSet Plus is probably the winner.

*Computer Buyers Guide & Handbook, Paul Rothweiler—*DeskSet Plus rates and gets from CBG & H the highest of marks.

*Byte, Mark Welch—*I found DeskSet's Pop-Up Calculator to be the best for office work.

*PC World, Danny Goodman—*Financial Calculator is the height of functionality. Perhaps the best feature of Pop-Up DeskSet Plus is the Clipboard when used in tandem with a recent addition called Pop-Up Anything.

*Business Software—*Pop-Up PopDOS is an almost necessary addition to the operating system.

*Computer Retailers' Guide, Mick Taylor—*The DeskSet is a very powerful set of tools that is both flexible and easy to use.

*Online Today, Ernest Mau—*Pop-Ups add flair to operations and enhance computer utility.

*Cummins Engine Co., Ivan Myers—*Much better than the competition (know anyone who wants to buy a "Sidekick"? \$25).

*J. P. Edmunds—*It is so good, your computer is not complete without it.

*Hewlett-Packard, Samson Espartaco—*Very impressed with automatic/timed program execution.

*Atlantic Richfield Co., Craig Parker—*For the first time I can use my printer options!

*On the Wing, William Gross—*Outstanding!

*State Law Library, Austin, Texas, Jim Hambleton—*I find PopDOS very helpful in arranging documents on my data disk when using WordStar.

*Planning Research Corp., William Hand—*It is a big help in keeping me on schedule.

*IRT Corporation, Jack Wilson—*Very useful and easy to learn and use.

## B. COMPARE POP-UP DESKSET WITH WHAT THE COMPETITION OFFERS—NO OTHER DESKTOP PACKAGE EVEN COMES CLOSE.

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Automatic word wrap	YES	No	No
Word processor files unlimited in size	YES	No	No
Search and replace	YES	Yes	No
Block commands (copy, move, delete)	YES	Yes	No
Keystrokes required to paste 20 lines of numbers into spreadsheet	6	52	Can't
Adjustable margins	YES	Yes	No
Scheduler message size	UNLIMITED	30char	35char
Alerts you to appointments	YES	No	Yes
Stop watch/timer	YES	No	No
Start programs at specific time (unattended operation)	YES	No	No
Display time constantly	YES	No	No
Date stamp documents	YES	No	No
Calculator has on-screen and printable tape	YES	No	No
Does financial calculations (interest, annuities, etc.)	YES	No	No
Statistical analysis mode (standard deviation, etc.)	YES	No	No
Allow user access to any DOS command	YES	No	No
Allow user to run any program while within another	YES	No	No
Set up printer while in an application	YES	No	No
Use printer as electronic typewriter	YES	No	No
Auto dial phone numbers	YES	Yes	No
Tools entirely RAM-resident	YES	No	No
Load only what you want/expand as needed	YES	No	No

*PC Tech Journal, Ted Forgeron—*Sidekick has been banished from my hard disk to a dark corner of my Flip-n-File.

*Robert Newman—*Excellent—meets my needs better than Sidekick.

*David Gleason—*It's great for dBase development to be able to print, rename, view files without exiting.

*Professional Business Equipment, Inc.—*Works very well on a multiuser environment. Customers have been very impressed. We expect to sell them with many of our systems.

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Here is Pop-Up Word demonstrating cut-and-paste capability, with import from Lotus 1-2-3 highlighted.

### TELECOMMUNICATIONS

Pop-Up TeleComm	Sidekick Spotlight	Smart Comm II*	Comat Tele-X11™
YES	No	No	No
Available any time (at a keystroke)	YES	No	Yes
Send text directly from service or application program	YES	No	Yes
Fax and receive at and binary files	YES	No	Yes
Hayes modem baud rates supported	300-1200	None	300-1200
	2400		2400
	110-9600	None	110-9600
Direct connect baud rates supported	300-1200	None	300-1200
Specifically supports PBX and long distance services	YES	No	Yes
Automatically logs on to service	YES	No	Yes
VT-52 VT-100 terminal emulation	YES	No	Yes

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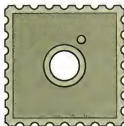


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# LETTERS TO PC MAGAZINE



## TWO VIEWS OF APARTHEID

I enjoyed Stan Augarten's excellent column devoted to computers and apartheid (Computers in Society, *PC Magazine*, Volume 4 Number 25). It's about time we faced up to the role that business and technology often play in support of inhumane or totalitarian systems. I was, however, a little disappointed by his failure to mention that Apple Computer has stopped all shipments of its products to South Africa as a whole—not just to the security agencies or government. Perhaps if more U.S. companies were willing to take such a firm stand, we really could help bring about a peaceful change to that tortured land.

Douglas Peterson  
Chicago, Illinois

Are you changing your magazine into yet another social commentary book, or what? I do not subscribe to *PC Magazine* in search of yet another source of puerile homiletics such as the Augarten thing on apartheid. We have a God's plenty and to spare of vehicles open to such savants: Every newsstand groans under the weight of their sermons. Couldn't *PC Magazine* leave the sociology to them? You took up good editorial space with that stuff.

George Dark  
Elk Grove Village, Illinois

## DATABASE REFLECTIONS

I have used some of the software reviewed in the cover stories in *PC Magazine*, Volume 4 Number 21. The article "Cost-Effective Database Management" prompted me to take a second look at my copy of *PC File III*. I found it was just what I needed for simple applications, so I used it immediately.

The *Dac-Easy* accounting program was

favorably reviewed in "Taking Your Budget into Account" and was listed as the Editor's Choice, but I'd like to alert everyone to the shortcomings of this software.

The documentation for the program is good but time-consuming. It took about 16 hours to convert our set of books over to this system. After setting up the necessary files, a quick CHKDSK revealed to my horror that *Dac-Easy* had set up, all told, 1.5 megabytes of totally empty files onto my 10-megabyte hard disk, taking one-half of my usable space. I will fully use that extra space only when I fill all of these files to capacity.

I'm sure hard disk users at a larger business would flinch the way I did at the idea of wasting space on-disk for anticipated



needs. *Dac-Easy* does allow you to alter the file size at any time, but the process is quite time-consuming.

Another constriction is that each account number is determined by a single entry in the general ledger interface and can be posted only to those particular accounts from the subsidiary module—not from the general ledger.

The individual modules in this program don't allow tailoring of any of the invoice formats, purchase orders, and so forth.

Bob Cooperrider  
Sheridan, Oregon

A spokesman from DAC Software told us that users have to define the file size in the setup procedure, so if it set aside 1.5 megabytes in file space, then that's what you told it to do. The reason *Dac-Easy* lets you update your general ledger only from a subledger is to avoid creating an imbalance. However, you always have the option of not creating any subledgers in a file. You're right about not being able to tailor the *Dac-Easy* forms, but DAC says that it's working on incorporating that and many other valuable user suggestions into its future releases.—Ed.

## QUADLINK ADVICE

In PC Advisor (*PC Magazine*, Volume 4 Number 22, page 38), Gus Venditto recommended Quadram's Quadlink emulation board to a reader. I'd like to add to what Venditto wrote. The Quadlink will run Apple II-family software even if it's copy protected. Quadram does hold back one bit of information, which I learned the hard way after a phone call to Quadram.

The board recognizes only one game port: its own. If you have any other game port operational, the board will not function.

Quadram doesn't furnish Integer BASIC. This may or may not be a problem for users. Other than these problems, the board does everything Quadram claims it does.

D.I. Saffrin  
Vernon Hills, Illinois

## SOULS OF THE NEW MACHINES

I always enjoyed Stephen Manes's wit and insight. However, while I'm sure that most of his audience read his review of *Midas Valley* (Computers in Society, Volume 4 Number 24) with a growing conviction

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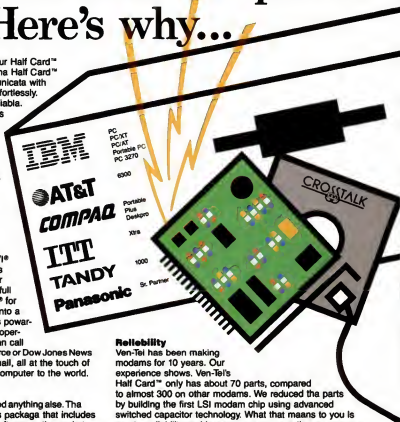
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## ■ LETTERS TO PC MAGAZINE

that Hollywood had indeed gone "Silicon Valley" until they reached the end of the article, the more astute fans of Manes's column must have come to the same conclusion that I did: that Manes's own prose is itself the work of a program even more sophisticated—DOS 2.0 or later—than the one he describes as punching out scripts and graphics for a TV movie. Casual readers probably overlooked the subtle twists and turns that marked the piece as a true mating of machine intellect and suitable application.

Think of the irony: A computer program that pretends to reveal an electronic conspiracy in Hollywood! This would make a great script in itself. To those of us who appreciate great hacking, this is the ultimate irony in artificial intelligence.

Then again, there is a rumor going around that there is a carefully crafted gem of a program that's generating fantastically clever letters to *PC Magazine*. The whole thing is chip-boggling.

Robert West  
Stone Mountain, Georgia

### MADE IN THE USA

In the caption accompanying the AT&T PC 6300 photo ("AT&T PC 6300," *PC Magazine*, Volume 4 Number 23), reference is made to the tilt-and-swivel mechanism that "shows the European concern for ergonomics."

Actually, the mechanism was devised in the United States. Also, both the keyboard and monitor housing for the AT&T PC 6300 were designed for AT&T by Henry Dreyfuss Associates and are manufactured by Olivetti for proprietary use on the 6300.

D.M. Genaro  
New York, New York

### ELECTRONIC PUBLISHING PERSPECTIVES

After reading Ron Jeffries's interview with Gary Kildall about electronic publishing (*Quantum Leap*, *PC Magazine*, Volume 4 Number 23), I worry about Mr. Kildall's assertion that "someone is going to say, 'Hey—we can save \$99 in manufacturing costs by using an optical disk!'"

Though I have great admiration for Mr. Kildall's contributions to the microcomputer revolution, the history of consumer

communications suggests that there are two other important factors in the equation. First, the material made available to the consumer in the new medium (CD ROM as opposed to paper book) must be either significantly cheaper or of better quality than that of the old medium. Second, the cost of acquiring the means to use the new medium must be either trivial or nonexistent.

We have done considerable research in the areas of pay TV, satellite broadcasting, and consumer video, and all our findings show that the consumer is interested in new technology only as a means to access new or better program material and not as an end in itself.

Rod Allen  
London Weekend Television  
London, England



### DESKPRO SERVICE PROBLEMS

I wholeheartedly agree with Alfred Poor's evaluation of both the Compaq Deskpro 286 and the Portable 286 ("High-Performance Alternatives to the PC AT," *PC Magazine*, Volume 4 Number 23). As a consultant I've recommended the purchase of four Deskpro 286 machines. However, Compaq's support is worthy of comment.

A hardware offering as superb as the 286 deserves much more support from the manufacturer than it is receiving. I've tried to find information not available in the machine's accompanying materials. Calls to the Computerland stores closest to me produced statements of noncooperation because the unit hadn't been purchased from them. Compaq directed me to contact its "authorized" dealer for information with the assurance that the dealer was, indeed, obligated to furnish such information regardless of origin of purchase. Only after considerable pressure did Compaq finally answer the questions I had.

My clients and I do not object to the idea of paying a premium price for Compaqs, but that price should also be accompanied by a level of support that at least matches other companies' offerings.

J. O'Loughlin  
Huron, Ohio

### SPECTRUM GAME BOOT

I too ran into the problem you noted with the Genoa Spectrum about self-booting game programs' not being able to make the Spectrum shift mode ("Genoa and Paradise: A Superset of Graphics Standards," *PC Magazine*, Volume 4 Number 26). I bypassed this problem by reconfiguring the Spectrum to boot up in colorgraphics emulation mode and put 'SM MT' (switch modes to monochrome text) in my AUTOEXEC.BAT file.

Bob Levittan  
Halesite, NY

### IN DEFENSE OF THE 8088

I must take issue with Ron Jeffries's declaration that the 8088 chip is D-E-A-D (*Quantum Leap*, *PC Magazine*, Volume 4 Number 22). PCs based on the 8088 are still selling very well, so I can't imagine IBM pulling this chip away from apparently satisfied customers. Besides, the 8088 is cheap, reliable, and compatible with just about every piece of PC software ever written. It may be a little slow for power users, but an 8088-powered PC is adequate for most users, especially with a reasonably fast 20-megabyte disk in tow. Though I appreciate Jeffries's interest in better personal computers, the 8088 provides plenty of power for the price.

Todd Natkin  
Washington, D.C.

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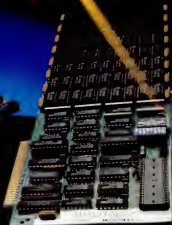
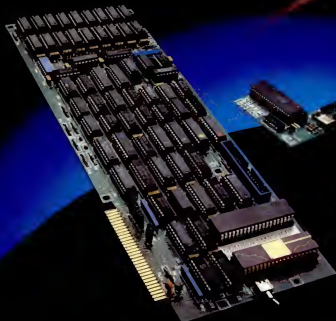
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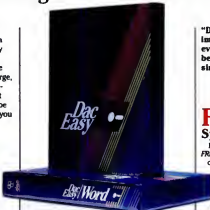
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**123 Report Writer\***  
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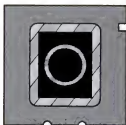
The collage shows multiple instances of the 1-2-3 Report Writer interface. One screen displays a detailed financial report with columns for 'DATE', 'AMOUNT', 'COST', 'GROSS', and 'NET'. Another screen shows a personnel report with fields for 'NAME', 'TITLE', 'DEPT', and 'SALARY'. A third screen displays a form with various input fields and checkboxes. The reports are formatted with bold text, underlines, and italics, demonstrating the software's capabilities for customizing document appearance.

\*1-2-3 Report Writer made files created by 1-2-3 Release 1A and Release 2, and Symphony® release 3.0 and release 3.1. Suggested retail price for 1-2-3 Report Writer is \$50.  
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■ EDITED BY GUS VENDITTO

# PC ADVISOR

*The PC Advisor enhances your productivity by helping you choose the best hardware and software products to meet your specific needs.*



## FROM BAR CODES TO PIE CHARTS

My Printronix 150L printer is very versatile with the programmable graphics board installed. However, I would like to make the escape codes compatible with either the IBM or Epson printers in order to do 1-2-3 graphics, dump screens, and so forth.

Please advise me on how to go about doing this. I have no knowledge of assembly/machine language.

Steve Brown  
Ontario, Canada

*Machine language won't help you here. The obstacle is in your printer, which was designed to produce bar codes. It is very similar to other ASCII-compatible graphic printers with two exceptions: It has a smaller dot size to produce the thin lines needed for universal product codes (UPC) and its PROM (programmable read-only memory) chip does not include the high-order ASCII codes needed to produce the kind of graphics you want.*

*You might get acceptable graphics by running the PRSWAP program written by PC Magazine editor John Dickinson for the September 17, 1985, Programming column (Volume 4 Number 19). It uses letters to mimic ASCII graphics characters.*

*But you really should take advantage of new PROM chips offered by Printronix (Irvine, CA 92713; (714) 863-1900). It has replacements for the three PROM chips in the 150L. These control the fonts, the mechanics, and the logic interface. The latter, called the DCU, decodes input from the PC. A new DCU (Version 50.63; list price, \$50; part # 117160-001) should*

*give you IBM graphics compatibility. However, depending on how old the printer is, you may need to replace the other two chips, so that they'll understand the new data; your local distributor will be able to help. But the first step is to replace the DCU chip.*

## ADDING RAM TO A COMPATIBLE

I own a Zenith Z-150 PC. I read in another publication that you can make a memory upgrade directly to the Z-150 motherboard using 256K chips and so save buying an additional board and/or using 64K chips. Is this true? If so, please advise me of a publication or supplier I could consult.

Andre Brunskill  
Des Moines, Iowa

*The 64K- and 256K-bit RAM chips sold by many dealers, including the mail-order services that advertise in the pages of PC Magazine, are compatible with your Z-*

*150 and just about all IBM PC compatibles. We recommend using 64K chips because your Z-150 has a PAL (programmable array logic) chip programmed to accept 64K chips; it must be replaced if you upgrade with 256K chips. Also, the motherboard, which comes with 128K bytes of RAM, can recognize only a total of 320K bytes (any additional memory up to a total of 640K bytes must be on an expansion board); if you use 256K-bit chips, you're wasting 64K. The cheapest, easiest memory upgrade you can make is with three sets of 64K chips, for a total of 320K bytes of RAM.*

*By the way, 64K-bit chips usually come in sets or banks of 9 (8 bits in a byte, plus an extra chip for the parity bit); they should cost about \$4-\$6 a set. Plugging them in on the motherboard is a simple enough affair, no special tools are required. Just be sure you read the section in your manual on adding chips. You will have to change the settings on the board's DIP switch; the manual shows how.*

*If you feel uncomfortable with the barebones assistance offered there, buy one of the books offering guidance in tinkering with your PC's innards. A good one is The Plain English Maintenance & Repair Guide for IBM Personal Computers, by Henry Beechhold (Computer Book Division, Simon & Schuster, New York, NY 10020; ISBN, 0-671-52864-5; list price, \$14.95); it covers compatibles, too.*

■ **The 64K- and 256K-bit RAM chips sold by many dealers are compatible with your Z-150 and just about all IBM PC compatibles.**

**ASK FOR ADVICE** Send your questions to PC Advisor, PC Magazine, One Park Ave., New York, NY 10016. ■



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# LEARN 'C' FOR MISTAKE! AT PRICES ANY BUDGET CAN AFFORD)

**L**earning C was once a rough go: First you spent a little money on a book. Then you spent a lot of money on a compiler. Then you spent a load of time figuring out what the two were talking about.

That changed when RUN/C debuted. It is an interpreter. It puts C at your fingertips, makes it interactive. It has a 900-page manual: every feature of C matches across the pages in an alphabetical procession of micro chapters. It gives you over 100 sample programs on disk to try out, all discussed in the text. And it sold for a great price.

## RUN/C INTERPRETER: Huge Manual and Sample Programs Make 'C' a Breeze to Learn.

**N**ow RUN/C is better than ever. We have paired it with Mark Williams' LET's C™ at a special price — ideal for learning the language on a shoestring. Or if you are already an expert, or just want advanced features, there's the new RUN/C Professional. Three giant programs with gentle prices.

RUN/C makes C like IBM® BASIC, with familiar commands like LOAD, MERGE, SAVE and FILES. It has a full-

screen editor with a WordStar®-like feel which allows you to insert, edit, list or delete lines on the spot. At any time, just ask RUN/C — and your program executes instantly. If an error halts it, RUN/C explains why and where. Just EDIT and RUN again.

What a difference. Because, times, you wrote C programs with an editor. Editors are inert. They don't know how to run a program, so there's no way to

test little segments, get any feedback. And then finally ready to attempt a compile, only if your entire program gives 100 for grammar and permanence you see any of it actually run. RUN/C puts an end to that glacial, forbidding ordeal. It lets you test code rapidly, without fussy checking. No more making things extra busy for the compiler. Instead, try out things devil-may-care. Let RUN/C find your misspellings and malapropes. It's nothing to change them and re-RUN.

### HOW RUN/C DOES IT

Being an interpreter, RUN/C expects nothing but source code, but it's equipped with over 100 standard functions — a composite of the function libraries of major compilers — so that, should you someday compile your RUN/C program, function calls will likely find counterparts in your compiler's library.

Functions can call in "define" and other source code files — functions you have already written, for example, or functions from commercial libraries which provide source code, like Greenleaf and BASIC. C.

### NO END OF FEATURES

The more you look, the more powerful that product gets. TRON displays each line of source code as it executes, pinpointing where a program takes a wrong turn. TRACE shows the values of variables in a statement each time it is

encountered. FROM lists a program after a run showing the number of times each statement was executed, a vivid picture where to optimize for efficiency. RUN/C has a SHELL command which will invoke any operating system command, with both RUN/C and your program in memory. No need to exit and reload everything.

And finally, the EDITOR command. Assuming enough memory, if you do not wish to part with your favorite editor, RUN/C can load it in parallel to let you switch back and forth.

### NO BETTER WAY TO LEARN C

RUN/C makes a splendid teacher. Its manual not only explains RUN/C, but provides a thorough-going demonstration of the C language itself. Over 100 of its short chapters are devoted to RUN/C's build-in functions, each with a sample program demonstrating use. These same programs are on the disk. So as you read them in the manual, you can run them on the screen, see what they do, discover why they do it, tamper with them to learn by experiment.

It's all here. A thoroughly satisfying steep climb along high quality documentation, source code examples, editor, interpreter and utilities which will add speed and pleasure to programming.

Product	List	PC Brand
S0910	\$120	\$109

## RUN/C's NEW PROFESSIONAL MODEL: The Interpreter That Links to Binary Libraries.

**R**UN/C Professional has every feature contained in RUN/C, but adds some major capabilities. The big difference — Loadable Libraries™ which tackles the professional programmer's greatest obstacle to using an interpreter. If an interpreter expects nothing but source code, how does one integrate professional libraries which come only in binary?

RUN/C Professional does just that. It dynamically loads (and even unloads) multiple object code function libraries while it is the interpreter. Once set up, simply command:

loadlib clobd

... and come and get it! The full plate of C-Food Smorgasbord's functions can be called from your program as if they were built right into RUN/C. Your program can now reach for Greenleaf Functions™, the C Utility Library™ — any of the professional libraries compiled using Lettice's large model. RUN/C's manual clearly documents how to construct, using Lettice, loadable programs like our "clobd" above, extracting any selection of functions you desire from Greenleaf Libraries.

How about your own function collection? No reason why not. Compile them up into a Lettice large model library and set them up for RUN/C to import the same way.

### WILL CHANGE HOW YOU WORK

RUN/C Professional will interpret your program, but the called library functions what by at compiled code speed. RUN/C Pro thus becomes a first front end for projects of any size. Its new ability to access object code means that, as you complete source code segments of a large

project, you can move them into fast-executing object libraries in a continuous stream until the entire job is converted.

### BIGGER BUG KILLERS TOO!

RUN/C Professional adds a new level of built-in debugging aids to RUN/C's TRON and TRACE. They are ingeniously installed behind one of RUN/C's built-in functions, so you can even call for debugging conditionally.

Call the debugging function with virtually any of RUN/C's own commands in a string argument (e.g., "LIST 400-500"); it will execute your command and continue the program. Or call it anywhere in your program with the argument "break" and you'll have a menu of aids to choose from: Type prompt C statements for immediate execution, or switch on step-by-step tracing, or change variable values in the current function, or display even "automatic" variables from the full chain of functions leading to the current function. RUN/C is alert, ready to go, so much more immediate and responsive than the clunking editor/compiler treadmill. Superb for rapid, on-the-spot testing of what you are writing. RUN/C shows you results while the thoughts are still fresh, helps get code up and running much quicker.

Product	List	PC Brand
S0980	\$250	\$225

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## LET'S C COMPILER: The Famous, Full-Featured Mark Williams Is Now Sized for Any Budget.

**I**f I told you that the top-rated \$495 Mark Williams compiler can now be had for \$75, you'd ask whose brother-in-law wrote it or his bright helper, right?

Well, it's legitimate. The folks at Mark Williams went C usage to expand more rapidly. Make available a low-cost version of their great product, they reason, and in time people will trade up to Big Mark. So they created LET's C. First, the big one has been built in debugging. That is not LET's C. Instead, that post-compile debugger can be had in a separate \$75 product. Second, LET's C supports the small memory model, not the large. And you are saying, they have backed the poor little piece.

Not so! LET's C is the full Mark Williams compiler in every other respect. The same

fast, compact code and rapid compile times, with register variables and even the optimization features of its big brother. The same assembler, linker, archiver, and UNIX™-style utilities, such as extended grep, tail, wc, plus the macroEMACS full-screen editor with source.

In fact, we offer the full Mark Williams two pages forward. No point repeating ourselves further. The real point is that, if you are learning C, you probably won't need the large memory model, so LET's C is an astonishing value which will fill your agenda for some time to come.

Product	Code	Price
LET's C	S0980	\$75
C Source Debugger	S0170	\$75

### SPECIAL COMBINATION OFFER

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From RUN/C to RUN/C Professional \$65

RUN/C & LET's C	\$200	\$175
RUN/C & LET's C	\$325	\$275

### SOME TECHNICAL NOTES

RUN/C occupies nearly 150K bytes, and requires 256K of RAM. Programs up to 10,000 lines can be interpreted, although 2,000 lines is a more realistic ceiling. Structures, unions, initializers and if-defines with arguments are supported, as well as keyboard and screen redirection from and to files. No extern definitions. RUN/C requires that all functions must be disclosed or MERGED. REGISTER and function pointers are not supported as of this writing. RUN/C automatically senses and uses the 8087 and 80287 math chips.

RUN/C PROFESSIONAL requires a minimum of 320K of RAM with 512K recommended for management of multiple loaded libraries. The Lettice compiler is required to create a Loadable Library.

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In the best of the system must be the GSS-Device™ package, which loads atop DOS. It conforms to the proposed ANSI virtual device interface (VDI). Drives runs a variety of devices and switches between them, insulating the applications developer from output device variations which require reworking and recompilation.

Then you have a choice of tools. First, "The Language" C is other languages are libraries of primitives with which your program can build graphics images. Each binding links to Drivers to form a working unit sufficient to produce graphics.

Productivity, though, begins with GSS-Toolkit™. Each—Kernel, Plotting, or Metafile—is a library which wraps the bindings for all the supported languages with an envelope of intelligent tools.

Kernel knows how to drive the bindings primitives to draw and color an object, store the sequential instructions, and recreate the object on its own, as well as

segment it, transform it, and all the while return data on attribute settings, system and device status. So powerful, a single command may represent several score lower level statements. It offers all the capabilities of level 32 of the ANSI Graphics Kernel Systems (GKS) spec.

Plotting has equivalent tools specializing in graph and chart generation and their capturing, least it apples and oranges, say "YIP," and it balances the numbers into a disposable display for screen or plotters.

Kernel and Plotting have tools to convert images they create to virtual device metafiles (VDMs), a trademarked standard for storing graphic images as data. The Metafile Interpreter reads the contents of a VDM and assembles a lot re-creation on various devices.

Now, what about royalties? There are none as such. Instead, pay a premium—now or later—for each component and you can license or copy any number of applications for redistribution.

Quality software? IBM thinks so. They sell the GSS series under their own label.

## LATICE C COMPILER Over 25,000 Users Make it the Best Seller by Far

Lattice C has been the standard-bearer compiler for years. Peter Norton in PC Magazine (1/8/85) said, "Best for systems programming: tight code, local control of memory, and a lot of other goodies more than any of its competitors." After reviewing new compilers for the PC, The Tech Journal (unofficially declared Lattice C "best" for software development.

When Lattice C appeared, there was nothing comparable. Ever since, software developers have created exceptional tools and kitchen libraries to marry into Lattice. Programmers now have an enormous resource of libraries and utilities to speed their work. That's a vital consideration in buying a compiler. Better check whether the latest goodies may have only grown up to go with it.

Lattice C runs on virtually any computer using an 8086 or 8088 chip, and generates code which optimizes use of the 8087 chip if present. Create your source files with any word processor or text editor and Lattice will compile them into Intel 8086 object module format for linking to other modules by DOS's Link or our Flink®.

Lattice C offers a choice of four memory modules between MK and RAM capacity of program data to allow you to choose the right combination of main memory efficiency and large memory addressability. It is a full implementation of

## BETTER BASIC POWER! BASIC Gets Serious With This Hefty Implementation

If you have several thousand hours of BASIC programming under your wing, what a dilemma the great migration to C poses! Leave all that experience (and code) behind and head for new horizons? Or stay in the BASIC world and become an endangered species?

Along comes BetterBASIC™. Its design principle is simple—build the most useful features of C, Pascal, and Modula 2 into BASIC, while retaining the familiarity of a language already known to millions.

BetterBASIC is big: its hugely expanded features require 100K, your programs can go all the way to the PC's 16 MB. It is comfortable; it behaves like Microsoft BASIC at the interactive level, with a full-screen editor, direct statement execution, and always poised to RUN. But it is like BetterBASIC is not an interpreter. It is an incremental compiler: each line you type is compiled (and error-checked) when entered, not re-interpreted over and over at run time. So the classic: Save benchmarks runs over 16 times faster than Microsoft

BASIC can manage.

BetterBASIC indents automatically for logical, readable listings, and is a word with statements to encourage structure. Loop structures like FOR...WHILE are treated as nested, not logical blocks of code, safeguarding against typical BASIC badness by not permitting GO TOs in or out.

BetterBASIC adds the renowned powers of C Variables defined as pointers, store addresses of other variables assigned to them, such as arrays or strings. Use pointers to directly load new data into addresses at much higher speed.

If you know C, you never thought BASIC would ever have structure, but here they are. A structure groups variables of different types into a record which is given a name. Arrayed of such structures may be defined to accommodate data for multiple records. The structure name is all that is needed for file reads and writes, leading to the unimpaired device of C's FILE, CVD, LIST, RESE, etc. Are you listening Microsoft users? They, and the Babel of redundant variables they need, are, gone.

BetterBASIC has "procedures." They take the place of BASIC subroutines. Set up in their own work space and edited separately or as screen procedures cannot be a kind of main program code. They are named by name, not (as in GOSUB) by line number, and variables declared within them cannot be affected by the main program or other procedures unless deliberately passed back and forth.

Best of all, once you have sturdy procedures which can be relied on never to fail, store them in compiled modules. Have BetterBASIC fold in such modules at load time, so they are generally available to your coding, just like PRINT or INPUT. So what have we here? That's right, an extensible language to which you can add your own commands!

So...to C or not to C? Well, maybe not. At last it's a real choice.

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## MARK WILLIAMS C SYSTEM Compile With Built In Source Debugging

With the usual compiler, your source code disappears down a black hole as if your program doesn't do what you intended, there's no telling what's going on in there. Here, thanks for turning the lights on!

Mark Williams thinks you shouldn't be marooned in space. Their C Programming System™ responds the universe with a secure code level debugger which comes with their compiler, so you can watch your own innards code, not headcrack! (Isosm, float by as it executes, with your program's output to another window.)

You can set breakpoints to stop execution on source lines or when variables change, log functions called to chart the course your program took, check local variables to test different outcomes.

The compiler itself has long been a

bright star. It is a full K&R implementation and then some, with enumerated and void data types, structure parameters, and Berkeley rules. Fully UNIX compatible, it boasts small and large memory models, 8087 support, ROMable code, DOS calls and the fastest compiler library around. Extensive optimization lets this compiler claim the fastest code and fastest execution of all the compiler luminaries, especially with the large model. You comments confirm it, and so do reviews: "Has the most professional level of any package we tested," Byte (8/83). "Of all the compilers reviewed... first choice for product development." PC World (8/84).

Product Code: S1500	Our Price:
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## EGA Standard Evolves For PC Graphics Users

BY CHARLES BERMANT  
AND CHRIS JOHNSTON

NEW YORK—A year after its release, IBM's Enhanced Graphics Adapter standard is being emulated, improved, and made cheaper by more than a half dozen peripheral manufacturers.

The first EGA-compatible boards, most with additional features, were introduced at fall COMDEX; by spring at least eight should be on the market. Most add Hercules monochrome graphics emulation to the three IBM display types on the EGA card and come with 256K bytes of memory. Some add a printer port or fit in a short slot.

IBM introduced the EGA in September 1984 in conjunction with the \$845 Enhanced Color Display, intending the pair to become the standard-bearer for higher resolution color/graphics. It gave PC users access to

16 colors at both 320 by 200 pixels (the original color/graphics standard) and 640 by 350 (enhanced color graphics), along with 640 by 350 and graphics in four shades of gray in monochrome emulation.

### Other EGA Boards

The new EGA boards range in price from \$495 to \$600, neatly undercutting IBM's \$982 list price for a comparable 256K-byte configuration. Most also emulate the 720 by 348 Hercules Graphics Card for monochrome monitors.

Boards will be produced by Video-7, Quadram Corp., AST Research, Atronic International, Genoa, Paradise Systems, Tseng Laboratories, and Orchid Technologies. Several of the new EGA boards were to have been available by January. Later arrivals will come from AST, Tseng, Paradise, and Orchid.

(continued on next page)

### The New Enhanced Graphics Adapter Cards

Company & Product	Price	Hercules	Memory	Features	Available	Warranty
IBM: EGA (64K)	\$524		64K		✓	1 year
IBM: EGA (256K)	\$982		256K		✓	1 year
Video-7: VEGA	\$599	✓	256K	Half card	✓	2 years
Quadram: QuadEGA	\$595	✓	256K	MS Windows	✓	1 year
AST: AST-36	\$600	✓	256K	Printer port		2 years
Genoa: Spectra-EGA	\$495	✓	256K	Printer port	✓	1 year
STB: EGA Plus	\$595		256K	Accelerator PC	✓	1 year
Tseng: Eva	\$580	✓	256K	Printer port		1 year
Atronic: Megagraph	\$499		256K		✓	1 year
Paradise: TBA	\$495	✓	256K	Half card		1 year

All boards emulate the original IBM Color Graphics (320 x 200 pixels), IBM Enhanced Graphics (640 x 300 pixels), and IBM Monochrome (640 x 350 pixels) adapters. All support a light pen interface.

## Reflex Adds Windows and New Analytic Capabilities

BY FRANK J. DERFLER

Barlind International's new \$99.95 database management program, *Reflex: The Analyst*, is a product you should know about. In addition to being inexpensive, it is fast, very capable, and provides some views of data that you can't get out of the most popular DBMS products.

*Reflex's* greatest strength is

that you can see your records and fields laid out in columns and rows like a spreadsheet. You also can see simultaneously, in other windows on the screen, a record in tabular form, display derived cells such as totals or averages, or show various types of charts and graphs.

*Reflex* does a fine job of keeping records, updating them, and printing out the data in various

formats. But *Reflex* excels as an analytical tool, enabling you to contrast and compare the details of the information you have in the database and derive new information in statistical and graphic forms.

This program is fine for developing a mailing list or inventory, but its unique capabilities really shine when you need to perform tasks like graphing cus-

tomers by ZIP code or totaling the net present value of all inventory over 60 days old.

### A 1-2-3 User's Delight

*Reflex* is designed to appeal to people who are familiar with 1-2-3. Like 1-2-3, *Reflex* uses the Slash key to bring up a horizontal menu and will put extensive formulas into particular cells. 1-2-3 users will appreciate the fast graphing and charting function in *Reflex* and the familiar template for the special function keys. *Reflex's* pull-down menus efficiently display the currently useful menu

(continued on next page)

## EGA Standard

(Continued from preceding page)

Once they are available in quantity this spring, price-conscious buyers should be able to find an EGA card and matching color monitor for less than \$1,000, compared with \$1,827 list for the IBM pair.

The IBM EGA is also available in a bare-bones \$524 64K-byte version but, according to Video-7's chief executive officer, Don Bryson, "Customers who buy the EGA with 64K will end up wanting more within a few hours. With a 64K EGA, you're not getting full color, speed, or performance. Most of the specialty software written for the EGA needs 256K to run."

### EGA Chips

Memory chips that populate the EGA are more costly than memory chips found on a normal motherboard. They are 16K-byte by 4-bit chips (IBM) or 64K-byte by 4-bit (all others) instead of the 64K-byte by 1-bit RAM chips that are available for as little as \$10 in sets of nine.

Most of the EGA boards coming to market utilize a four-chip set from Chips and Technology of Milpitas, Calif. Tseng Laboratories is shipping a 3-chip set to OEM customers, and Paradise Systems is developing a single EGA chip for OEM use, as well as for an as-yet-unnamed Paradise board available in April.

The new EGA boards are generally better equipped, re-

flecting the philosophy that a combination of lower price and more-versatile performance is the only way to beat IBM.

### Quadram and Video-7

Quadram of Norcross, Ga., and the Milpitas, Calif.-based Video-7 have combined technical and marketing strengths. However, each company is releasing its own EGA board. Quadram's full slot Quad EGA+ will be available primarily through retail outlets, while Video-7's VEGA, which takes up a half-slot will concentrate on the OEM marketplace. Video-7 was the first to the market with its board, released in early December.

Quadram claims "110 percent IBM compatibility," because, according to a company spokesman, the board runs more color/graphics software than the IBM EGA. Both the Quadram and Video-7 boards operate in four modes: EGA, Color/Graphics Adapter (CGA), Monochrome Graphics Adapter, and Hercules Graphics Card.

Hercules monochrome graphics compatibility is boasted as a selling point on many of the new boards. But Kevin Jenkins, president of Berkeley, Calif.-based Hercules Computer Technology, says Hercules won't be producing an EGA card, even though it now makes a CGA-compatible Hercules ColorCard that is a best-seller.

Instead, Hercules hopes to create its own color standard later this year with a non-EGA-

## VEGA, Quad EGA+ Beat IBM on Versatility

### FIRST LOOK

BY CHARLES PETZOLD

The first two EGA-compatible video boards to hit the market, the VEGA from Video-7 Inc. and the Quad EGA+ from Quadram, passed their first brief test in PC Magazine Labs. Both boards successfully ran *Microsoft Windows* in 640 by 350 pixel 16-color mode, 1-2-3 graphics using Lotus's new EGA drivers, and two PC Magazine Labs test programs

The Video-7 VEGA (half-card) and Quad EGA+ appear to offer functional and more-versatile alternatives to IBM's adapter.



for EGA graphics. Functionally, the two boards are the same. They use 28 chips,

compatible color card offering higher resolution.

"I don't believe cloning the EGA is the future for graphics board manufacturers," says Jenkins. "It's a poor design and doesn't deserve to be cloned."

Jenkins maintains there is a better way to achieve a higher level of graphics performance than EGA.

IBM offers a higher-resolution 640- by 480-pixel Professional Graphics Controller, but the price limits its appeal: \$2,995 list for the card, \$1,295 for the Professional Graphics Display.

Other manufacturers, such as Solon, Ohio-based Tecmar, believes the EGA makes sense.

The company missed the early wave, but Tecmar is now actively developing its own EGA contender, according to a company spokesperson.

"There is no question in my mind that the EGA resolves the problems plaguing PC users," says Tony Paradiso of AST Research in Irvine, Calif. "It is the ideal adapter. There are some drawbacks, such as price premium and the fact that software hasn't caught up with its potential."

AST has previously bundled its products with utility programs such as *SideKick* and *DESQview*. Paradiso says that the company will "investigate the possibility" of bundling its

## Reflex

(continued from preceding page)

choices in bold characters.

*Reflex* can import and export files in the formats of the *PFS* family of programs, *dBASE II* and *III*, *1-2-3*, and *Symphony*. It can also use ASCII text files in several different forms.

*Reflex* runs efficiently on an IBM PC or compatible with two disk drives, but some disk swapping will be involved. It is much easier to run this DBMS in a hard disk system. The program requires 384K bytes of RAM and an IBM Color/Graph-

Form view of a database record in Reflex. The form contains the following fields and values:

- Name of Firm: **IBM CORP.**
- Address: **400 N. MICHIGAN**
- Primary Contact: **RECORD**
- Last Name: **First:** **Module:**
- Title: **SALES REPRESENTATIVE**
- City: **State:** **Zip:**
- Phone Number:
- Birthdate:
- Secretary's Name:
- Sales Rep:
- Best Recent Contact:
- Total Sales Last 12 Months:
- Comments:
- Lines: **006** of **001**

*Reflex: The Analyst, Borland's \$99.95 database program, shows five views of data by using pull-down menus. The form view (above) is used to enter field names.*

ics Adapter or Enhanced Graphics Adapter or a Hercules Graphics Card for the IBM Monochrome Display. A color monitor isn't required because *Reflex* doesn't display color, but it does use screen graphics. Color can, however, be added to *Reflex* with simple screen utilities, as shown in the screen shot (at left). You can use the program in any of the PC work-alike machines that come equipped for graphics without having to invest in an RGB monitor. A mouse can be used to make menu selections, but it is not required.



including four identical custom LSI chips, a 16K-byte ROM, and eight 64K-byte by 4-bit memory chips for a total of 256K bytes, the EGA maximum. The VEGA card packs smaller chips on a half-length card. Both include a monitor-select toggle switch, while IBM uses a jumper.

The boards will include software to switch them into CGA or Hercules compatibility modes, but this software was not available for PC Magazine Labs' initial test. The CGA compatibility mode apparently will allow software that does its own programming of the 6845 graphics controller chip on the CGA to successfully run on these cards. (Some do not run on IBM's EGA.) ■

AST 3-G board with software programs in the future.

Quadram's QuadEGA+ comes bundled with *Microsoft Windows*. The STB EGA Plus includes *PC Accelerator*, a utility package.

#### EGA on a Motherboard

Cost-conscious manufacturers of PC compatibles may find savings by building PCs with an EGA-plus-Hercules chip set on the motherboard. While graphics standards continually evolve, officials at Video-7 believe that any PC offering monochrome, CGA, EGA, and Hercules display emulation faces little danger of obsolescence in the next few years. ■

A *Reflex* database can have 65K-byte records of 128 fields with 254 characters in each field. However, the major limitation of this program is that all of the data you want to work with must be in one file. Unfortunately, *Reflex* cannot relate between records in different files based on common fields.

#### Seeing Data

The use of windows in *Reflex* lets you see data in many different ways. If you put a display of the typical columns and rows of data in the top half of the screen, you can at the same time show a

## Optimem, 3M Take the Lead with Erasable Optical Storage Devices

BY CRAIG L. STARK

LAS VEGAS—Optical storage devices were among the most promising technologies displayed at fall COMDEX. Perhaps the most exciting technological development was a joint announcement by Optimem and 3M that may hasten the advent of real-world erasable optical storage devices.

Optimem has developed a multifunction drive that can handle all three types of 5½-inch optical media: magneto-optic erasable, write-once read-many (WORM), and optical read-only (OROM). 3M is already shipping its pregrooved, plastic-based, erasable magneto-optic disks to Optimem, and a fully functional prototype of the drive was demonstrated at the show. It's likely, however, to be a year or two before you can buy a production model for your desktop.

Optical storage devices that permit user recording (but not erasing) are available to the consumer today, however. For large-scale needs, Optimem introduced its 1000S, a WORM drive that stores one gigabyte of data on a 12-inch removable disk. Supplied with full PC interface and software, the 1000S runs under DOS 3.0 or 3.1. Its \$20,000 cost may seem high—until you realize that it's only \$20 per megabyte.

sort of electronic notepad in the bottom half. The notepad holds the complete information on one data record. The displayed information in the notepad changes as you scroll the cursor through records on the top. Similarly, you can create a line chart or bar graph in one window and watch it change as you scroll through the data in the other window. The charts and graphs can be designed to create color images on a plotter or printer but not on the screen.

Even if *Reflex* cost \$495 (which it did until Borland acquired its developer, Analytica

#### ISI's WORM Drive

For somewhat smaller needs, ISI's 525 WC 5½-inch WORM drive, holding 115 formatted and certified megabytes per side, is now available in quantity from the Colorado Springs, Colo., company for \$1,598 and in single-unit "evaluation kits" for \$2,495. The package includes a single-board controller and ISIDOS, a device driver and file-management utility that is compatible with DOS 2.0 (or later) and runs on both PCs and

quarter of this year and has signed OEM agreements with Tallgrass Technologies Corp. and Lancor Technologies Inc., both of whom showed prototypes (a combination optical disk/tape backup and a LAN file server, respectively) at the 1985 fall COMDEX show in Las Vegas.

While 4.7-inch CD ROM and 5¼-inch OROMs are not user-recordable, they are a natural for applications such as electronic publishing. Sony introduced its CDU-5002 CD ROM,



Information Storage Inc.'s ISI 525 WC 5½-inch WORM drive holds 115 megabytes per disk side. It comes with single- or double-sided disks—media manufactured by Sumitomo.

compatibles. Extra disks (media manufactured by Sumitomo) cost \$60 for single-sided and \$99 for double-sided versions.

Similarly, Optotek expects to begin shipping VAR quantities of its 400-megabyte 5984 5¼-inch WORM in the first

designed to fit into a 5½-inch full-height floppy opening, at a price of \$795 each, plus an interface card for the PC (\$200) or the PC-XT (\$295). Tecmar also introduced its standalone CD Massfile reader, at a heftier \$1,695 (plus \$295 controller). ■

Corp.), it would be a good tool for aiding managers making decisions based on sales, financial, or inventory reports. The same people who give briefings and sales presentations based on numbers they derive from spreadsheets can take advantage of the analytical functions in *Reflex*.

But at \$99.95, this program can become everyman's DBMS. Its features make it practical for designing file plans, sorting mailing lists, and performing other routine office chores. It could become a standard tool for every PC user. ■

#### PC MAGAZINE FACT FILE

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# VP-Planner Bests 1-2-3 On Features, Price

## FIRST LOOK

BY DAVID HOFFMAN

Adam Osborne has made good his threat to shake the foundations of high-priced microcomputer software with the introduction of *VP-Planner*. Paperback Software International, Osborne's Berkeley, Calif.-based publishing company, has released a \$99.95 1-2-3 work-alike with extra spreadsheet features, *dBASE* file compatibility, and a multidimensional facility that allows sophisticated data structures.

The experienced 1-2-3 user can load *VP-Planner* in a matter of minutes and throw the manual away if he or she is not interested in its extra features. *VP-Planner* uses the .WKS file format and includes macro compatibility. With very few exceptions, these files can be imported and exported freely between *VP-Planner* and 1-2-3. *Symphony* 1.1 and 1-2-3, Version 2.0, files can be retrieved by *VP-Planner* if they have been renamed with a .WKS extension.

However, formulas and macro instructions that are not applicable to 1-2-3, Version 1A, will cause errors. An up-to-date "README" file highlights potential compatibility problems.

### Cosmetic Differences

The *VP-Planner* worksheet is loaded from a start-up menu that is also used to allow access to its multidimensional counterpart. There are cosmetic differences from 1-2-3; the *VP-Planner* screen is a bit more cluttered than 1-2-3. The Slash key calls the menu to the bottom of the screen rather than to the top. On-screen row and column positions are highlighted on the "frame," making it easier to determine the position of the cell pointer.

Menu items can be selected by using the function keys as

well as by pointing with the cursor or typing the initial letter of the menu choice.

Limited testing showed *VP-Planner* to be significantly slower than 1-2-3 in performing mathematical calculations. One

system time and available memory are displayed continuously on-screen.

### Four More Windows

*VP-Planner* allows six independent windows, versus two

The screenshot shows a spreadsheet window titled "You can transfer information". It contains a table with columns for months (JUN, JUL, AUG, SEP, OCT, NOV) and rows for various financial items. The data is as follows:

	JUN	JUL	AUG	SEP	OCT	NOV
Estimated Unit Sales	2100	2200	2300	2400	2500	2600
Estimated Unit Selling Price \$	2100	2200	2300	2400	2500	2600
Estimated Gross Revenue	441000	484000	529000	576000	625000	676000
Estimated Purchase Price \$	1500	1600	1700	1800	1900	2000
Estimated Total Purchase Cost	31500	35200	39100	43200	47500	52000
Estimated Gross Profit	410000	449000	490000	533000	578000	624000
Est. Gross Profit %	93%	94%	94%	94%	94%	94%
Actual Unit Sales						
Actual Unit Selling Price						
Actual Gross						
Actual Unit Cost \$						
Actual Gross Profit						

*VP-Planner*, a \$99.95 1-2-3 work-alike, imports and exports *dBASE* and 1-2-3 files and has up to six windows.

procedure, which included the data file operation and repeated copying of columns of formulas, took 70 seconds in 1-2-3, Version 1A. The same operation took 3 minutes and 10 seconds with *VP-Planner*. A recalculation that required 12 seconds for 1-2-3 to compute was done by *VP-Planner* in 35 seconds.

Paperback Software's executive vice president, Ron Ogg, admits that *VP-Planner* is slower as a result of the program's sparse matrix memory management scheme, which allows a more efficient use of computer memory.

Time-of-day and polynomial math functions have been added. A new wait command (/XW) delays macro execution for a specified number of seconds. Expanded-range formatting options allow for time-of-day and two user-definable formats, as well as the ability to hide a range's contents. The

for 1-2-3. It supports zero (hidden) column width, to control the general appearance of the worksheet and eliminate unwanted columns during printing. Column width can be set for a range of columns, as opposed to doing it one column at a time.

*VP-Planner* includes a "learn mode" in which a series of keystrokes is "recorded" and assigned to a function key for "playback." The recorded keystrokes may also be used in a standard macro.

### Background Printing

A print menu option allows background printing so that, for example, a large worksheet can be printed while the user continues working with the program. The graph menu includes a print option that generates a full-page graphics dump to a dot-matrix printer.

Paperback Software's Ogg says the ability to save graphs in

.PIC format (as well as a utility for .DIF file conversion) will be available to users in an update. An optional printing program that includes plotter support and increased flexibility will be available for a nominal charge.

### Works with *dBASE*

*VP-Planner* allows for direct input and output of .DBF files from Ashton-Tate's *dBASE II* or *III*. Using selection criteria, data can be joined from several files. Data from *dBASE* can be modified in *VP-Planner*, but records may not be deleted.

The multidimensional capability of *VP-Planner* extends the simple row-and-column structure of the standard spreadsheet. A simple example is where a worksheet is used on a monthly basis. In *VP-Planner*, a third dimension of time can be used to link 12 months of data together, with a 13th layer that consolidates data automatically. *VP-Planner* uses virtual memory techniques to allow up to five dimensions in a worksheet.

The manual, which is contained in a thick paperback book that also holds both program disks, does an adequate job of describing the program but does not pretend to be a comprehensive guide to 1-2-3 usage. In fact, it specifically recommends outside reading and includes a bibliography of introductory and advanced 1-2-3 reference materials. ■

## PC FACT FILE

**VP-Planner**  
Paperback Software  
International  
2612 Eighth St.  
Berkeley, CA 94710  
(415) 644-2116

List Price: \$99.95; non-copy-protected version available to registered users for \$10.  
Requires: 256K RAM, one floppy disk drive, DOS 2.0 or later.

In Short: A 1-2-3 work-alike with extra features, including *dBASE* file compatibility and up to six windows.

# This Little Fella Means Business.

The Mouse by Maynard Electronics makes your favorite programs faster, easier, and smarter!



At last, an "intelligent" mouse! Now you can add command power to your programs, when you want, the way you want — instantly! The Mouse by Maynard Electronics comes with our CustomKey™ software which lets you assign and reassign commands while using your favorite programs — even those without mouse utilities. Fly through programs like Symphony,\* Lotus 1-2-3,\* Framework,\* MultiMate,\* and others with undreamed of speed! And of course, it's fully compatible with all programs written for a mouse, too.

\*Symphony and Lotus 1-2-3 are trademarks of Lotus Development Corporation. Framework is a trademark of Ashton-Tate. MultiMate is a trademark of SoftWork Systems Inc. Telepaint is a trademark of LCS/Telegraphics.

## Teach The Mouse To Type.

A single Mouse click will instantly produce the character, sentence, paragraph, or anything else you've selected. **Click:** you call up the CustomKey menu. **Click:** your file is saved. **Click:** a commonly used paragraph appears in place. No other mouse gives you such power and versatility.

## A Tale Of Three Mice . . .

Compare our Mouse with the others running around and you'll see, there's no comparison! Here are just a few features across the board:

FEATURES	Maynard Mouse	Micro-soft	Mouse Systems
# of Button Combinations	7	3	5
Button Auto Repeat	Yes	No	No
Diagnostics	Yes	No	Yes
Dynamic Scaling	Yes	No	No
Cursor Overshoot Control	Yes	No	No
Adjustable Cursor Speed Up, Dn (while running application)	Yes	No	No
Adjustable Cursor Speed Rt, Lt (while running application)	Yes	No	No
Buttons-Definable (while running application)	Yes	No	No
Macro-Definable (while running application)	Yes	No	No
User-Definable Alternate Cursor Movement	Yes	No	No

## Free Drawing!

Purchase The Mouse now and receive the popular paint program Telepaint\* at no additional cost — a \$149 value!



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CIRCLE 478 ON READER SERVICE CARD

# "...Sherman tank of hard disk drives."

-InfoWorld  
July 22, 1985



## HAVE A NICE INQUISITION, DEAR.

When InfoWorld's contributing editor, Bernie Zilbergeld and the InfoWorld Review Board said they reviewed our ATplus20™ hard disk drive, we figured that they gave it the routine technical and performance diagnostics.

We didn't expect destructive testing. They went after our legendary resistance to head-crashes with a vengeance.

## HOW TO HENCH.

Mr. Z and his henchpersons began by subjecting the drive to 3,500 stops and starts.

Having survived this, our ATplus20™ drive then had to face increasingly severe physical torture while performing a seemingly relentless series of track seeking operations.

## THINGS THAT GO BUMP IN THE DAY.

Further henching resulted in their bumping the table that the ATplus20™ was running on.

Then they dropped one side of the table from a height of six inches.

Next, the entire table was lifted one foot above the floor and dropped.

After cutting power to the drive (thus interrupting the seek test) they bumped the table severely, to see if the ATplus20's unconditional and automatic park and lock feature really makes a difference.

Then, they threw the book at us. Actually, they dropped a rather heavy book *directly* on top of the drive itself.

## GUESS WHAT?

You're absolutely right. CORE's ATplus20™ hard disk drive not only survived, but continued to perform as specified.

Each of the rather unnerving tests was repeated a number of times on the same drive, just to be extra sure. Or mean.

## THE LAWYER'S 2¢.

The tests were so nasty that they had to publish the following warning: "We caution you not to perform any of these tests on your own equipment."

We have to agree.

These tests were done to determine the limits of the drive, and were intentionally extreme beyond the normal use environment.

## SEAL OF APPROVAL.

We're delighted that InfoWorld tested, evaluated and *validated* exactly what we have been saying all along: Now you can build the enhanced PC-AT that IBM didn't.



## DOS, XENIX & MORE.

Along with the highest reliability among PC-AT compatible drives, we offer full compatibility with PC-DOS 3.0 and higher.

And XENIX™ compatibility with CORE's ATplus™ XENIX update.

A significant number of ATplus drives are running under the IBM, NOVELL and other networks.

Those users are delighted with our speed and performance.

## PEACE OF MIND.

ATplus™ drives come with a full one-year warranty, supported by CORE and other major maintenance service companies.

Thus, we offer you a choice of on-site, local or exchange maintenance services.

Known as CORE's Sudden Support™, all services are extendable to your entire AT system, and after the warranty runs out.

## WE'LL BE AROUND.

We're the world's largest supplier of high-performance PC-AT compatible hard disk drives.

Now, respected magazines such as InfoWorld and PC Magazine have told you how we got there.

Please contact us directly for full and unedited reprints of this and other prominent computer magazine reviews.

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Telex: 315 809 CORE INTL DEBE

# THE PC'S LIMITED AT™ —\$1995. THE PC'S LIMITED TURBO PC™ —\$795.



At these prices, it's no wonder  
we're burning up the marketplace.

Yes, you can believe it. Since we ran our first advertisement for the PC's Limited AT™ and Turbo PC™, the calls we've received mostly start with comments like "Is this for real?" And "How can that be?" But now that our machines are in the hands of influential buyers, the questions tend to concern quantity discounts for further purchases. (Which are available.) You see, the PC's Limited machines are assembled from components bought worldwide with our strong buying power. Then they are offered directly to you—with no middleman markups. So fight a match to your old budgets. With the savings we're providing, you'll have money to burn.

## PC'S LIMITED AT™

- 80286-based System Unit (runs at 6MHz, 8MHz optional)
- 1024K on Mother Board
- 1.2 Meg Floppy Drive
- Combined Floppy/Hard Disk Controller Card
- AT Keyboard
- 192W Power Supply
- 2 Serials and 1 Parallel Port
- Clock/Calendar with Battery Backup

Runs all Major Software written for the IBM PC™, PC XT™, and PC AT™. Unit has 8 Expansion Slots, with 7 available in above configuration. Same Bus Configuration as IBM PC AT™.

## PC'S LIMITED TURBO PC™

- 16-bit 8088-2 System Unit (running at 4.77 or 6.66MHz)
- 640K on Mother Board
- 360K Floppy Drive
- Keyboard
- 135W Power Supply

Runs all Major Software written for the IBM PC™ and PC XT™, 40% faster, without modifications. Unit has 8 Expansion Slots, with 7 available in above configuration.

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## PC'S LIMITED™

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**CIRCLE 180 ON READER SERVICE CARD**



# NO OTHER HARD DISK BACKS YOU UP LIKE SYSGEN. HARD DISK AND AUTOMATIC TAPE BACK-UP: \$1395.



10 Mbyte disk/20 Mbyte cassette tape with automatic tape back-up and error correction for \$1395.



INDUSTRY STANDARD  
QIC-24  
DATA FORMAT

20 Mbyte disk/60 Mbyte cartridge tape with QIC-24 industry standard tape format, automatic tape back-up and error correction for \$2095.

## Why the Sysgen Flat-Pak™ is your smartest storage and back-up choice:

The Flat-Pak, like all Sysgen systems, is designed so you can sit down at your PC and use it. Period. A reliable Sysgen hard disk keeps your data on-line. You never have to juggle disks or cartridges. And only Sysgen backs your data up automatically. All in a slim half-height chassis that slips neatly under your monitor. So absolutely nothing stands between you—and your work.

## Only Sysgen gives you *unattended* back-up.

Set the Flat-Pak once, like a VCR, and it will back up your data up to twice daily, seven days a week. *That's* smart.

## Two ways to get unbeatably affordable disk and tape add-on:

Choose the 10 Mbyte Flat-Pak with 20 Mbyte cassette back-up; or the 20 Mbyte version with 60 Mbyte

cartridge back-up, using the industry standard QIC-24 tape data format.

Because both Flat-Pak systems utilize your IBM's hard disk controller, they are compatible with all software written for current versions of PC DOS® (Should your system require it, Sysgen offers an XT compatible controller for just \$350.)

## Get the smartest, most reliable storage and back-up solution—at the best price.

Sysgen's entire disk and smart tape family offers an unbeatable combination of capacity and value. You won't find a smarter solution—or a better price.

Compare for yourself: For a Sysgen dealer near you, call 1-800-821-2151, Dept. 28



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(415) 490-6770, Telex 4990843

## NEWS IN BRIEF EDITED BY JANE MINTZER

**Kodak Expands Data Storage . . .** In an effort to provide an alternative to hard disk drives and low-storage floppy drives, **Eastman Kodak Co.** has announced three high-density disk drives.

The 12-megabyte drive, developed with **Data Technology Corp.** of Santa Clara, Calif., is a 5½-inch half-height removable cartridge drive with 10 megabytes of formatted storage capacity. It features a built-in controller with an embedded small-computer system interface, which allows the drive to communicate with mainframes and personal computers. The 10-megabyte drive utilizes a variable rate recording process that assigns a faster recording rate for the outer tracks and a slower rate for the inner tracks.

The advanced 6.6-megabyte drive is a 5¼-inch half-height floppy drive with a formatted storage capacity of 5.24 megabytes. The 3.3-megabyte floppy drive has a storage capacity of 2.78 megabytes. Both floppy drives have a fast (3-millisecond) track-to-track access time, a 500-kilobit-per-second transfer rate, and downward-read capabilities, which enable the drives to read data from lower-density drive/media combinations as found on the IBM PC and AT.

Eastman Kodak Co. is located at 343 State St., Rochester, NY 14650; (716) 724-4241.

**DEST Low-Cost Page Scanner . . .** DEST Corp. of Milpitas, Calif., announced PC Scan, a compact page scanner that automatically reads information from paper into PCs, and Text Pac, a character-recognition program for PC Scan that can transfer

text from the scanner directly into one of several word processing programs.

PC Scan has a character-recognition processor and an image-capturing capability that scans 300 dots per inch (or 20 seconds per page) and communicates to the PC through an industry-standard small-computer system interface. With Text Pac, PC Scan can enter text from the scanner into word processing programs such as MultiMate and WordStar in the exact format of each word processor. Text Pac can also recognize all common business documents. During a demonstration of the text scanner at the PC Magazine offices, PC Scan was able to scan random press releases with a minimal number of recognition errors.

PC Scan and Text Pac sell for \$1,995 and \$595, respectively. DEST Corp. is located at 1201 Cadillac Court, Milpitas, CA 95035; (408) 946-7100.

—Virginia Dudek

**Tape Backup with Mini Data Cartridges . . .**

Irwin Magnetics has become the first manufacturer to begin production of 40-megabyte tape backup systems using the new ½-inch 3M DC 2000 mini data cartridges. Two new drives, a half-height, 20-track, 5¼-inch internal unit (Model 145), and a full-height standalone model (Model 345) use the PC's own floppy disk controller and are supplied with Irwin's Level 4.0 software. Both drives can also read and write data using the Irwin-formatted DC 1000 cartridges, which use a 0.15-inch tape.

The DC 2000 cartridge is expected to become the mainstay of smaller tape backup systems, with large requirements being handled by the recently announced ½-inch 3480 IBM data cartridges.

The Irwin format uses a Reed Solomon error correction code instead of the 3M-recommended error correction system for the DC 2000, which requires less overhead (11 percent versus 50 percent) and no verification pass.

Irwin says the Model 145, which uses the PC's power supply, will cost well under \$1,000 and begin shipping by spring 1986.

—Craig L. Stark

**AI for the Masses . . .** The cost of an artificial intelligence application language has dropped to an affordable level courtesy of a company named **Chalcedony Enterprises**, whose \$99.95 Prolog V-Plus claims to be the first Prolog interpreter powerful enough for real-world applications at a real-world price. The program is able to use up to 640K of RAM, and its coresidency feature allows users to call up other programs to the screen while Prolog V-Plus is in use.

For more information, contact Chalcedony Enterprises at 5580 La Jolla Blvd., La Jolla, CA 92037; (619) 483-8513.

**Gem of a Utility . . .** Emerald Systems Corp. has made it possible for hard disks to be merged, saving small-capacity disks from the junk pile. **DiskMeld**, a software utility included with its line of high-capacity storage subsystems, combines separate drives into one logical volume. This allows PC users to add their existing disk capacity to that of the Emerald unit. Emerald vice president of engineering Peter Shultz says that the utility shatters the 32-megabyte DOS barrier, allowing for the creation of files as large as the combined disk size.

DiskMeld is available only with an Emerald disk system and there are no plans to market it as a separate product. Emerald's internal subsystems range in price from \$2,350 to \$16,310. For those wishing to learn more about DiskMeld and other Emerald products, the company is located at 4757 Morena Blvd., San Diego, CA 92117; (619) 270-1994.

—Charles Berman

**Epson Replaces FX-185 . . .** Epson America Inc. of Torrance, Calif. replaced its FX-185 dot matrix printer, just a half year after its introduction, with the new FX-286. The new FX-286 prints 200 characters per second in draft mode (40 cps faster than the FX-185) and 40 cps in near-letter-quality mode. The FX emulates both the Epson and the IBM

Proprietary codes.

Epson says that the new printer announcement did not result from a shortage of FX-185s, but rather from an increase in demand for a faster printer with improved features. Epson will fill back orders for the FX-185 with the FX-286. The FX-286 has a list price of \$749, \$50 more than the FX-185. The normal-carriage FX-85 model continues unchanged.



The new Epson FX-286 printer prints 40 cps faster in draft mode (200 cps) than the FX-185 it is replacing. This \$749 printer emulates both the Epson and the IBM Proprietary codes.

**Floppy Drives from Tandon . . .** Tandon Corp. has now introduced two new members of its Thinline series of half-height floppy drives for the IBM PC AT and compatibles. The TM75-2 has 360K bytes of recording capacity and will cost less than \$80 in OEM quantities. The TM75-8 has an OEM price of under \$100 and offers 1.2-megabyte capacity.

Both drives are available now. For more information, contact Tandon Corp. at 20320 Prairie St., Chatsworth, CA 91311; (818) 993-6644.



At a list price of \$1,995, PC Scan reads a page of text from paper to a personal computer at a rate of 20 seconds per page. PC Scan can be used with Text Pac, a character recognition program that transfers text to word processors.



# The right prices. The right products. The right choice.

## IBM HARDWARE

AST	List	Chart
Starpak Plus 54K	\$395	\$239
Starpak Plus 284K, 5.7/PC	\$595	\$389
Advantage Multi-Red for AT	\$552	\$449

<b>CENTRAL POINT</b>		
PC Option Board	\$ 95	\$ 9

<b>COMEX</b>		
120 Watt Power Supply	\$170	\$ 93

<b>EVEREX</b>		
The Edge, Color/Mono Board	\$399	\$289

<b>HERCULES</b>		
Color Card with Parallel Port	\$245	\$145

<b>IBM</b>		
8087 Chip	\$175	\$125

<b>HERCULES</b>		
Color Card with Parallel Port	\$245	\$145

<b>IBM</b>		
8087 Plus-5 Chip	\$245	\$145

<b>HERCULES</b>		
Color Card with Parallel Port	\$245	\$145

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8087 Plus-5 Chip	\$245	\$145

<b>HERCULES</b>		
Color Card with Parallel Port	\$245	\$145

## IBM SOFTWARE

ASHTON-TATE	List	Chart
FrameWork II	\$495	\$415
Database Manager, PC DOS & 128K	\$495	\$395

<b>BORLAND</b>		
Turbo Editor ToolBox	\$ 65	\$ 40

<b>BORLAND</b>		
Turbo GameWorks	\$ 70	\$ 40

<b>BORLAND</b>		
Turbo New Pack	\$ 50	\$ 30

<b>BORLAND</b>		
SuperKey/SlideKey Package	\$125	\$ 65

<b>BORLAND</b>		
Turbo Holiday Pack	\$125	\$ 65

<b>BORLAND</b>		
Turbo Jumbo Pack	\$245	\$130

<b>BORLAND</b>		
Reflex: The Analyst	\$ 95	\$ 50

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Reflex: The Analyst	\$ 95	\$ 50

<b>BORLAND</b>		
Reflex: The Analyst	\$ 95	\$ 50

## Internal Hard Drives

<b>10 meg</b>	List	Chart
with controller	\$389	

<b>20 meg</b>	List	Chart
with controller	\$489	

<b>30 meg</b>	List	Chart
with controller	\$589	

<b>40 meg</b>	List	Chart
with controller	\$689	

<b>50 meg</b>	List	Chart
with controller	\$789	

<b>60 meg</b>	List	Chart
with controller	\$889	

<b>70 meg</b>	List	Chart
with controller	\$989	

<b>80 meg</b>	List	Chart
with controller	\$1089	

<b>90 meg</b>	List	Chart
with controller	\$1189	

<b>100 meg</b>	List	Chart
with controller	\$1289	

<b>110 meg</b>	List	Chart
with controller	\$1389	

<b>120 meg</b>	List	Chart
with controller	\$1489	

<b>130 meg</b>	List	Chart
with controller	\$1589	

<b>140 meg</b>	List	Chart
with controller	\$1689	

<b>150 meg</b>	List	Chart
with controller	\$1789	

<b>160 meg</b>	List	Chart
with controller	\$1889	

<b>170 meg</b>	List	Chart
with controller	\$1989	

<b>180 meg</b>	List	Chart
with controller	\$2089	

<b>190 meg</b>	List	Chart
with controller	\$2189	

<b>200 meg</b>	List	Chart
with controller	\$2289	

<b>210 meg</b>	List	Chart
with controller	\$2389	

<b>220 meg</b>	List	Chart
with controller	\$2489	

<b>230 meg</b>	List	Chart
with controller	\$2589	

<b>240 meg</b>	List	Chart
with controller	\$2689	

<b>250 meg</b>	List	Chart
with controller	\$2789	

<b>260 meg</b>	List	Chart
with controller	\$2889	

<b>270 meg</b>	List	Chart
with controller	\$2989	

<b>280 meg</b>	List	Chart
with controller	\$3089	

<b>290 meg</b>	List	Chart
with controller	\$3189	

<b>300 meg</b>	List	Chart
with controller	\$3289	

<b>310 meg</b>	List	Chart
with controller	\$3389	

<b>320 meg</b>	List	Chart
with controller	\$3489	

<b>330 meg</b>	List	Chart
with controller	\$3589	

<b>340 meg</b>	List	Chart
with controller	\$3689	

## CHIP KITS

<b>64K</b>	\$ 8
1-99 sets \$10	100+ sets

<b>256K</b>	\$32
1-99 sets \$30	100+ sets

<b>128K</b>	\$37
1-99 sets \$35	100+ sets

<b>256K</b>	\$37
1-99 sets \$35	100+ sets

<b>512K</b>	\$37
1-99 sets \$35	100+ sets

<b>1024K</b>	\$37
1-99 sets \$35	100+ sets

<b>2048K</b>	\$37
1-99 sets \$35	100+ sets

<b>4096K</b>	\$37
1-99 sets \$35	100+ sets

<b>8192K</b>	\$37
1-99 sets \$35	100+ sets

<b>16384K</b>	\$37
1-99 sets \$35	100+ sets

<b>32768K</b>	\$37
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## PC UPDATE BY VIRGINIA DUDEK

NEW YORK - Multimate International of East Hartford, Conn., has announced Version 3.6 of the MultiMate Advantags Professional Word Processor. New features include support for up to eight columns per page. Users can now set the width and tabs for each column, as well as the spacing between columns. Version 3.6 also supports winding text and logically associated columns, which allows related text to run side by side. All editing functions are supported in the column mode, and text will be reformatted automatically. Also added are a 40,000-word thesaurus, a typewriter mode for creating and printing text character by character, and search capability for footnote symbols, double underlining, and section numbers. Upgrades are \$60. Those who bought Version 3.5 after December 1, 1985, can receive a free upgrade.

Microsoft Corp. of Bellevue, Wash., announced Version 4.0 of Microsoft Macro Assembler. The new version is written in C, and Microsoft claims that it's three times faster than the old version. Users can now assemble larger source files, with more symbols and macro text. New assembly switches have been added, as has screen swapping, which permits switching between the debugging screen and the application output. Version 4.0 has complete upward compatibility with earlier Microsoft and IBM Macro Assemblers. Registered users of the previous Microsoft, IBM, Texas Instruments, or Zenith versions can upgrade for \$75.

Digital Communications Associates of Alpharetta, Ga., announced that its IRMA micro-to-mainframe interface board will now be bundled with two file transfer software programs that are faster than the software previously included. IRMALink FT/TSO and FT/CMS permit rapid transfer of files between IBM mainframes and microcomputers in a 3270 communications network. Both programs also contain the PC segment of the fast file

transfer software program as well as the host section. Previously, IRMA only included software that contained the host section. The bundled IRMA board is still \$1,195. Users who have received IRMA between August 1, 1985 and November 15, 1985 can request a free copy of the PC portion of FT/TSO and FT/CMS from DCA. The two file transfer programs can also be purchased separately for \$115 each.

Short Takes: Toshiba America Inc. of Tustin, Calif., announced that dual emulation of Qume Sprint 11 daisy wheel printers and the IBM Graphics Printer is now standard on the 24-pin Toshiba P351 3-in-One dot matrix printer. The Toshiba P351 now uses the full IBM Extended Character Set, with block graphics characters, and performs full graphics screen dumps from PCs ... Fox and Geller of Elmswood Park, N.J., announced dUTIL-III Plus, a new version of its dBASE programmer's toolbox. dUTIL-III Plus works with dBASE III and dBASE III Plus. New features include the ability to produce complete cross-references listings of dBASE programs, support for PROCEDURES files, and an "include" feature that lets you store commonly used code in one place for simplified program maintenance. dUTIL-III Plus retails for \$149. Upgrades are \$39 ... Alpha Software Corp. of Burlington, Mass., announced Version 1.1 of Electric Desk, an integrated spreadsheet, word processor, database manager, and communications program. Version 1.1 has a DOS access service that lets users perform DOS functions without exiting from Electric Desk. Also added are global search and replace and expanded index commands for multilevel sorting. Upgrades are \$59.

PC Update reports on software and hardware enhancements. To contribute, write or call Virginia Dudek, PC Magazine, One Park Avenue, New York, NY 10016, (212) 503-5265.

## Demo Programs Simulate Software, Aid Teaching

BY CHRISTOPHER JOHNSTON

Demonstrating how to use particular programs or even simulating programs not yet in existence is now a snap, thanks to two recently released products.

Dan Bricklin's *Demo Program*, \$74.95 from Software Garden (P.O. Box 238; West Newton, MA 02165; (617) 322-2240), is designed primarily to be a software developer's tool. The program simulates a working program by creating dummy

screens, simulating disk access, and allowing keyboard entry. One possible use, says Bricklin, codeveloper of *VisiCalc*, is that it enables programmers to give venture capitalists a feel for what a program will look like once it's written.

### AutoMentor Tutorials

For the considerably more expensive *AutoMentor* (\$895), from Software Recording Corp. (600 Fifth Ave.; San Rafael, CA 94901; (415) 258-0800), creating demos of not-yet-writ-

ten programs is only one of its functions. *AutoMentor* can record keystrokes of other programs, then play them back later with inserted messages for other users.

For instance, a central office could create and record the keystrokes for a 1-2-3 template, which would be distributed to branch offices. Upon playback, the worksheet would be created, and messages would appear on screen, such as "insert fourth-quarter results here" with an arrow pointing to the appropriate cells. An optional speech board (\$950) digitizes spoken messages that can later be replayed in the program.

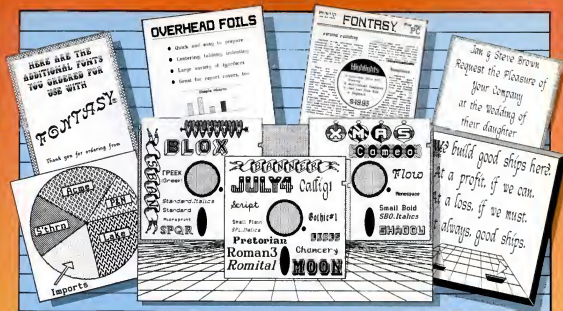
With *AutoMentor*, software

companies can rapidly create tutorials overlaid on an actual program. Software Recording is also targeting *AutoMentor* toward large corporations that would like to automate training sessions.

Both programs include the choice of keystroke as well as screen recording and editing, highlights for important notation, boxes for commenting, and the utilization of all 256 PC screen characters. Screens can be timed to produce a PC slide show.

*AutoMentor* also offers painting commands and menus.

*AutoMentor* demo disks are \$10, and a run-time version is available for \$2,500.



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## Choosing a modem for your personal computer just got easier.

Modems are remarkable little gadgets. They can connect you and your PC to mountains of data and oceans of information. But up until now, deciding which modem to buy hasn't been easy. So to solve that little problem, IBM is offering two 1,200 bps PC modems. Modems that not only give you the best features currently available on PC modems, but also offer features usually found only on higher priced, higher speed modems.

### **First, a Brief Introduction to the IBM PC Modems:**

The IBM 5841 is a stand-alone modem capable of operating at 0-300, 600 and 1,200 bps in asynchronous mode, and 600 and 1,200 bps synchronous.

Our other modem is the IBM Personal Computer Modem—an internal, half-card modem that operates at 0-300, 600 and 1,200 bps asynchronous.

### **The Non-Identical Twins**

In some respects, these two modems are very similar. For example, they both have Automatic Adaptive Equalization—which means they will continuously fine-tune themselves to compensate for changes and noises on the telephone line. The result is, you can receive data over a wider range of phone line conditions. This is one of those features more often found on faster, more expensive modems.

In addition to automatic answering, both modems offer Adaptive Dialing—which means that if you don't specify either tone or pulse dialing, the modems try tone dialing for one digit, and if that doesn't work,

they automatically switch to pulse dialing.

Both modems will automatically re-dial a number as many times as you tell them to. Or if you prefer, they can switch to an alternate number on a busy signal or a no answer. Once a connection is made, the modems automatically detect and adjust to the incoming transmission speed. They can also initiate an automatic log-on sequence including control characters, ID number and password.

And both modems have extensive "Help" menus, a complete complement of built-in diagnostics, a programmable speaker, and two phone jacks on the back so both your phone and the modem can be connected to the same line at the same time. You can even switch between voice and data without interrupting the phone call.

### **A Modem with a Memory of Its Own**

The IBM 5841 stand-alone modem has some additional features you don't usually find on 1,200 bps modems. For example, the modem is switchable between asynchronous and synchronous modes and has a 20-entry Dialing Directory. Kept in non-volatile



# CModems

storage, the directory enables the modem to dial up and log on to systems automatically. This feature is most convenient when the 5841 is used with a fixed-function ASCII terminal such as the IBM 3161 or 3163.

The front panel of the 5841 has a complete array of eight LED Status Indicators to give you a quick visual check on what's happening.

## A Half-Card Is Better Than a Whole

Why? Because the IBM Personal Computer Modem can use a short slot in the IBM PC XT and the *Portable* PC. It also fits nicely into a full slot in the IBM PC and the PC AT.

Another nice touch is that a PC diagnostic diskette comes with each of these half-card modems.

## Standards & Compatibility

You'll be pleased to know that both modems meet the Bell 103/212A and V. 22 CCITT standards. Both

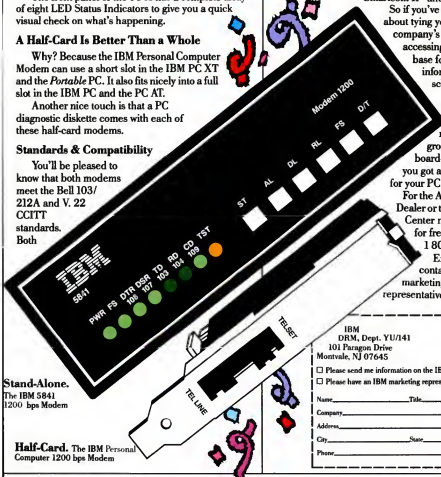
can use the industry standard "AT" command set, as well as the IBM command set. And both modems have been tested for compatibility with leading PC communications software such as the IBM PC Communications Manager, Crosstalk™ XVI, Smartcom II® and Transporter.™

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# Kaypro 2000: Small but Hefty MS-DOS Portable

## FIRST LOOK

BY BILL MACHROME

The Kaypro 2000 is a sleek, sophisticated MS-DOS portable. It is a strange staminate to the Kaypros that have come before it. They've been rugged, low-cost, no-nonsense computers, a cross between a Jeep and a lunch pail. The 2000, by contrast, is more Ferrari than Jeep.

In one package, the 2000 combines a 24 by 80 liquid crystal screen, a 3½-inch disk drive, 768K bytes of RAM, a 300-bps modem, and a removable keyboard. The screen area, 3 by 9 inches, is masked off from a larger 6- by 10-inch display area, ready for better, cheaper displays in the future. You control the contrast from the keyboard, but it has only one view-

ing angle. To counter this limitation, the keyboard detaches from its berth and can be moved a couple of feet from the main unit.

The keyboard has a tilt mechanism and a lively touch. It manages to cram all of the IBM's functionality into a usable, although nonstandard, layout. The only thing I didn't like was the use of an auxiliary Shift key to get at the PgUp, PgDn, Home, and End keys.

### Pop-up Disks

The disk drive, with its clever pop-up access, packs an amazing 730K bytes. One drive is clearly enough if your religion permits mixing data and programs on the same diskette. With the 2000's ample memory, you can set up a RAM disk for speed and still have plenty

left over for your applications. A storage compartment holds two 3½-inch diskettes.

If you choose the Kaypro 2000, you may never have to buy software. It comes with *WordStar*, *CorrectStar*, *StarIndex*, *MITE* telecommunications, *PolyWindows Desk*, and *The Traveling Expense Manager*.

### A Heavy Burden

So who is this machine for? It's too heavy to be a portable in the Tandy 100/200 or NEC Starlet class. In fact, at 14 pounds, it weighs considerably more than my typical 10-pound briefcase, complete with a Tandy 100. It doesn't fit the Compaq mold of full compatibility and portability. So it fits a niche where you need the familiarity of MS-DOS programs but not data interchange at the disk level. ■



The 14-pound Kaypro 2000 portable has a 24 by 80 LCD screen, 768K bytes of RAM, a 3½-inch floppy disk holding 730K bytes, and free software, including WordStar.

## PC FACT FILE

### Kaypro 2000

Kaypro Corp.  
533 Stevens Ave.  
Solana Beach, CA 92075  
(619) 481-4300

List Price: \$1,995 (256K RAM); \$2,490 (768K RAM and a modem)

In Short: A 14-pound half-laptop, half-portable that runs MS-DOS programs from a 3½-inch floppy disk.

# Starlet Features WordStar In 6-Pound Laptop Package

BY BILL HOWARD

With the NEC Starlet PC-8401A-LS, NEC Home Electronics Inc. offers a reasonable—and in many ways superior—alternative to the Tandy 200 that was *PC Magazine's* Editor's Choice among low-cost portables ("Nine Laptops to Go," Volume 4

Number 25).

Compared with the Tandy 200, the Starlet weighs a pound more, has 8K bytes more RAM, a better keyboard and word processor, less-distinguished spreadsheet and manuals, and a 16-line by 80-character screen instead of 16 by 40. The Starlet lacks BASIC and a four-function calculator. The two laptops, however, are more alike than different; with built-in 300-baud modems, \$1,000

list prices, files stored in RAM, easy connections to PCs, and flip-up LCD displays.

The Starlet uses *WordStar* To-Go rather than Tandy Corp.'s generic text processor.

Three programs complete the Starlet's repertoire: *Colc-To-Go* with a DIF option for exchanging spreadsheets with 1-2-3 and *Multipoint*; *Personal Filter*, for storing a salesperson's name-and-address file; and *Telcom*, for transferring files via modem and checking electronic mail or for serial-cable transfers to PCs.

NEC's characters display nearly one and a half times as big as other 80-column LCD

displays. But Tandy, limiting itself to 40 columns, has still bigger characters.

NEC's 32K-byte usable memory fills quickly. A 32K expansion module (\$199) sticks out of its side. A better choice might be the \$399 SideStar 128K-byte module from Purple Computing (420 Constitution Ave., Camarillo, CA 93010; (805) 987-1742).

The Starlet has a few less-than-endearing traits: The screen noisily ratchets open and shut; *WordStar* comes up with right justification on; and the screen is a bit hard on the eyes in low light. ■

## PC FACT FILE

NEC Starlet PC-8401A-LS  
NEC Home Electronics Inc.  
700 Nicholas Blvd.  
Elk Grove Village, IL 60007  
(312) 228-5900  
List Price: \$999

In Short: A 6-pound, LCD-screen laptop computer, similar to the Tandy 200, that comes with *WordStar*.

### Starlet and Tandy: NEC and NEC?

How the NEC Starlet stacks up against PC Magazine's Editor's Choice laptop.

	NEC Starlet PC-8401A-LS	Tandy Model 200
Price	\$999 (32K RAM)	\$995 (24K RAM)
Screen size	9½ × 3 inches	7½ × 4½ inches
Screen display	16 × 80 (480 × 128 dots)	16 × 40 (240 × 180 dots)
Weight	5.9 pounds	4.5 pounds
Footprint	11¼ × 8½ × 2¼ inches	11¼ × 6½ × 2¼ inches
Extra Memory	32K cartridge (\$199)	2 × 24K chips (\$249 each)

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# Norton Utilities: Still the Best?

BY WINN L. ROSCH

For years, *The Norton Utilities* have been the standard choice for adding powers to DOS that its writers forgot. The latest update, Version 3.10, adds even more abilities.

Now, less expensive products—*PC Tools* from Central Point and the *File Recovery System* from Brown Bag Software—offer similar enhancements and threaten Norton's dominance.

*The Norton Utilities* are known primarily for their file recovery abilities.

In Version 3.10, the intricate NU (main) program has been tamed somewhat by revising its default selections. Repeatedly pressing the Enter key is now enough to recover a file without a glance at the instructions. The 3.10 package also includes a pair of worthy new features—QU, or Quick Unerase, which can recover one file or a whole disk of them using a quick-and-easy query system, and a program to recover inadvertently removed subdirectories.

Also included in *The Norton Utilities* are short programs that make everyday disk use more convenient, including a file- and disk-erase utility that now will overwrite specifications.

## PC Tools: Not a Clone

Although *PC Tools* from Central Point Software (maker of *Copy II PC*) has many of the same features as *The Norton Utilities*, it can't be called a clone. Functions are in a single menu-driven program aimed more at superseding DOS commands than enhancing them. File copying, searching, sorting directories, printing, comparing, deleting, verifying, and changing individual bytes in a file or on-disk, are controlled through a consistent and logical menu system.

Unlike *The Norton Utilities*, *PC Tools* can be made memory resident, so you can call up all

of its power from the middle of other programs.

*PC Tools* enhances DOS with easy-to-use file recovery abilities, which work in most circumstances (but not as many as Norton), a map of disk space used, and a system information function that duplicates most Norton Utilities features.

## File Recovery System

*File Recovery System* from Brown Bag Software includes most of the features of the other two—file recovery, disk

Norton's Quick Unerase and *PC Tools* will probably take less time and trouble. When situations get tough, as with interwoven and multiple erased files, *File Recovery System's* power makes it the equal of Norton, however. And only *File Recovery System* will make an attempt to get data from physically damaged disks.

An enhanced version is promised, with added features to completely wipe files from a disk so that they are unrecoverable, rearrange disks so files are contiguous, and recover blocks of files with a single command.

## Disk Mechanic

*Disk Mechanic* from MLI Microsystems, like *File Recovery System*, gives you intimate

mettle. These programs are, in fact, inexpensive and different enough (even complementary) that you might just want more than one in your library. ■

## PC FACT FILE

### The Norton Utilities,

Version 3.10

Peter Norton

2210 Wilshire Blvd., #186

Santa Monica, CA 90403

(213) 826-8032

List Price: \$100, update \$25

Requires: 128K RAM, DOS

2.0 or later.

**In Short:** Improved ease of use in Version 3.10, especially file recovery, Norton remains the class act in a now crowded field of DOS utilities.

### PC Tools

Central Point Software

9700 SW Capitol Highway,

#100

Portland, OR 97219

(503) 244-5782

List Price: \$39.95

Requires: 192K RAM (256K

for resident operation).

**In Short:** Economical, menu-driven, memory-resident DOS command and enhancement program with increasing capabilities.

### File Recovery System

Brown Bag Software

15100 El Camino Grande

Saratoga, CA 95070

(408) 395-9568

List Price: \$49.95

Requires: DOS 1.0 or later.

128K RAM.

**In Short:** File recovery combined with disk drive manipulation and control functions.

### Disk Mechanic

MLI Microsystems

P.O. Box 825

Framingham, MA 01701

(617) 926-2055

List Price: \$70

Requires: 192K RAM on a

PC or XT, 256K RAM on an

AT, and 320K RAM on a

Compaq.

**In Short:** File recovery is one feature of this veteran disk manipulator.

C:\>qu

QU—Quick Unerase, Version 3.10, (C) Copr 1994-86, Peter Norton

There are 4 erased files in this directory  
all of them may possibly be Quick-Unerased

Erased files lose the first character of their names  
After selecting each file to Quick-Unerase, you will be  
asked to supply the missing character

TEST.1 11,661 bytes 12:58 on Tue Jan 1 89  
The filename 'BEST.1' will be used for the new Quick-Unerased file

TEST 4 bytes 1:04 on Tue Jan 1 89  
The filename 'TEST' will be used for the new Quick-Unerased file

TEST.2 4,334 bytes 4:40 on Tue Mar 19 85  
The filename 'BEST.2' will be used for the new Quick-Unerased file

TEST.3 11,187 bytes 4:14 on Mon Feb 4 85  
The filename 'TEST.3' will be used for the new Quick-Unerased file

C:\>

The Norton Utilities Quick Unerase feature, new in Version 3.10, can recover multiple lost files from a single disk

editing, directory sorting, and changing disk labels. It permits you to dig into the file allocation table, recover data from bad sectors, and even try to lift information from non-DOS disks and disks that have been formatted over.

*File Recovery System* claims to be the only file recovery program to work on DOS 1.0 and later, and on all hard disks. However, *PC Magazine* was unable to substantiate the latter claim. It would not recover a file from a disk emulator and refused to work at all on a PC's Limited AT. Both of those tasks were accomplished by the Norton and *PC Tools* programs.

For simple file recovery,

control of your system's floppy disks. The primary purpose of *Disk Mechanic* is to analyze and back up nonstandard (read: copy-protected) floppy disks. One option, however, allows recovery of erased files.

For its proven track record and power, *The Norton Utilities* remain the top choice for file recovery and DOS enhancement, though Brown Bag's *File Recovery System* now gives Norton tough competition, with more control over your system's disks (but fewer DOS enhancements) for less cash. When simple file recovery is sufficient or you value the ability to command DOS from within other programs, *PC Tools* proves its



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CIRCLE 202 ON READER SERVICE CARD



## COMMUNIQUE EDITED BY BILL HOWARD

## If You Can't Beat 'em, Beat 'em with a Club



The Hercules monochrome graphics standard is so popular, it's being imitated by a half-dozen other makers (see "EGA Standard Evolves for PC Graphics Users," page 33). Like Rambo, Hercules Computer Technology wants to fight back. The company was giving away, through the end of January, 5 1/2-inch Hercules dolls "designed to demolish cheap imitations of

Hercules's products."

While supplies last, the dolls are available by calling (800) 532-0600 from 9 a.m. to 8 p.m. EST.

In a similarly violent vein, Compucure Corp. (P.O. Box 105, Hilton Head, SC 29925; (800) 681-9460), a PC-to-main-frame repair company, introduced the Hacker Whacker, a maple-handle, aluminum-head mallet.

The Hacker Whacker is \$9.95, available so far in only one state—the land of nuts and chips—California. ■



## Then There's Bar Code News . . .

The computer magazine business succeeds best addressing specific markets rather than mass audiences, says publicist Ron Gold. "Being popular or creative isn't enough," he says.

In researching new markets for his *Personal Computer Publicity Book* (\$125, \$200 with disk from Gold, 1341 Ocean Ave., #366, Santa Monica, CA 90401, (213) 399-7938), Gold came up with these real-life, ultra-vertical market magazines that may be targets for people with computer products to sell: *Sludge Newsletter*, *Breeder & Feeder*, *Exhaust News*, *Weeds Today*, *Backflow Prevention*, *Pig International*, *Wrench & Bench*, *Butter Fat Magazine*, *Hose & Nozzle*, and *Gabbles*.

This is not a joke, Gold says. The magazines all exist. ■

## The PC Still Has Its Cover Completely On, But I'm Down to My Underwear

It's safe to speculate that IBM probably didn't have this computer game in mind when it opened the PC's architecture to the world. *Play Strip Poker With Fifi* allows PC users to match poker wits and the ability to stay dressed with any IBM PC or compatible.

The rules of the game are simple: If the player's hand beats the computer's, the on-screen image of Fifi sheds one of her garments to racy background music. The image "blushes" when sensitive anatomy is revealed. Players are theoretically honor-bound to respond in kind when they lose.

Ray Frederick, whose Seray Software markets *Strip Poker* (\$29.95), says the program accommodates only one player at a time, so it can't be used as an icebreaker. And while you can get Fifi to take it all off, says Frederick, "by the time you go

all the way, the details you get on a screen aren't enough to offend someone.

"I have a copy you can cheat with," Frederick says. "It's tough to win with a real copy." We bet you do, Ray. Alas,



Frederick says that there's no *Play Strip Poker With Tam Selleck* for the ladies. To get a copy of *Play Strip Poker With Fifi*, contact Seray Software, P.O. Box 510, Harvard, MA 01451. ■

## It Happened in Las Vegas

COMDEX exhibitors keep track of visitors to their booths by running the plastic show identification cards, embossed with the holder's name and address, through credit-card-like machines that produce multi-copy slips. This year, one attendee raised eyebrows by asking for his carbons back.

Microsoft Windows was one of the show's hottest new pieces of software, but try telling that to the boys on the street: A *PC Magazine* editor had his car broken into in a Vegas hotel parking lot. The discriminating thief found three unopened Windows packages in the trunk—and left them. ■

## We Never Noticed Much Difference

A friend in Texas passed along the second-funniest PC joke we've ever heard, surpassed only by the classic Apple knock-knock joke: \*

Q: What's the difference between a used-car salesman and a computer salesman?

A: The used-car salesman knows when he's lying.

best jokes will be published in a future issue. Jokes must be about computers and cannot be off-color; otherwise, the field is wide open. Include your name, address, and a phone number where you can be reached during the day. ■

\* "Knock, knock." "Who's there?" "Incredibly long pause." "Lin."

## Love at First Byte

Panda and Azure first met as "Plinkers" in January of 1985. They were married the following October.

Plinkers are subscribers to the People/Link recreational videotex network, and Panda and Azure are Pamela Ann Falczyk and Mark Crosby, a Chicago marketing presentation coordinator and a Dallas engineer, respectively. The couple exchanged pictures, met face to face, and quickly became engaged.

The bride stressed that People/Link is not a computer dating service. Rather, it's described as a "sophisticated, computerized version of citizens band radio." ■

## Cure Winter Doldrums

Heard anything unique or off-beat about the computer world? We pay \$50 for every item published. Send your submissions to Communiqué, *PC Magazine*, One Park Ave., New York, NY 10016; (212) 503-5293, MCI Mail 157-9301. ■

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CIRCLE 492 ON READER SERVICE CARD

## ■ FROM THE EDITOR'S SCREEN ■ BILL MACHRONE

## UNBRIDLED OPTIMISM

*Some people still think that the computer industry is going through a slump. But if this is a slump, why is everyone so cheerful?*



The marketplace has changed over the last year. Remember how everyone was speculating that IBM would introduce a closed-bus PC 2 or switch to a proprietary operating system? Only IBM, the theory went, could be big enough and dumb enough to kill the goose that laid the golden egg.

IBM is certainly big. But it isn't dumb. Oh, some of its products and decisions may seem dumb to you and me, but that's because they really aren't targeted at us. You'd have to search far and long before you could find someone who thinks that IBM is going to close the bus, but there are a few diehards within IBM who dream of doing their own operating system, poor benighted souls.

Last year there was talk of how the industry was unhealthy. Too much imitation, not enough innovation. We were sitting ducks for the Japanese, as the story went.

What are people worried about this year? Not much, as it turns out. No one cares if IBM introduces a new standard. The Japanese can sell us all the chips and disk drives they want, but they still can't establish a beachhead for a PC-compatible machine. In fact, the Japanese are plenty worried about the Taiwanese and Korean machines. They cost less and are more compatible than most of the Japanese offerings.

How did this state of affairs come to be? IBM has the marketing muscle to do anything it wants, right? Why aren't manufacturers quaking and quivering in the giant's shadow?

**WHO NEEDS IBM?** I've said it before and I'll (doubtless) say it again: IBM fails only when it is not IBM-compatible. Machines like the PCjr and the 3270 PC had one common flaw—they didn't run enough of the PC's mainstay programs. I shouldn't talk about the 3270 PC in the past tense, but orders for the machine are way off. Users have discovered that they can do a lot more with a standard PC and any of the 3270 adapter cards. So Compaq, AT&T, and Tandy didn't have to do slavish copies of the 3270 PC. The aftermarket did the hard part for them.

The compatibles manufacturers have powerful allies in companies like Phoenix Software Associates and Microsoft. Phoenix writes the ROM BIOS compatibility programs that make many compatibles work like IBM machines. They dance the thin line between compatibility and copyright infringement, and they do it well.

The market, meanwhile, has deter-

mined that PC-DOS is the only operating system it wants on the PC. Since Microsoft is free to sell the generic version of DOS to compatibles manufacturers, it has created a software bus that surpasses even the PC's hardware bus in universality. "Well-behaved" programs that follow all the DOS rules for interaction with the machine will run on virtually anything that runs DOS. A year ago, it wasn't so important to be well-behaved: No one was talking about multitasking, and applications programs were free to take over the machine if they wanted. Then all those RAM-resident utility programs started interfering with one another and the programs they were supposed to be supporting, and people started to realize that rules were a good thing.

Meanwhile, the marketplace doesn't seem to mind if Microsoft changes DOS to its heart's content as long as it offers some kind of backward compatibility. So Microsoft has gotten a little tougher about the rules and will get tougher still.



**CAN WINDOWS WORK?** It's hard to talk about a product that took 24 months to introduce as a bold step, but that's what *Microsoft Windows* is. It is a harbinger of the future—a future that transcends hardware compatibility. *Windows* has its problems. It needs a hard disk or a fast networked file server. It often needs more speed than a standard PC can muster. It also requires a graphics card, preferably the Enhanced Graphics Adapter. But it provides a consistent user interface and takes thousands of bytes of code out of applications software. And it multitasks.

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CIRCLE 127 ON READER SERVICE CARD

## ■ FROM THE EDITOR'S SCREEN

*DESQview* is the windowing system for today; *Microsoft Windows* is the windowing system for tomorrow. *DESQview* takes all your existing software and runs it, in character mode, on your existing system, with the help of Rampage! or a similar enhanced extended memory spec card. It makes your applications think that each of them has exclusive access to all the machine's memory when they are actually bank-switching.

*Microsoft Windows* does much the same thing, but it is pickier about which programs can share the display. Basically, an application has to be written to *Windows*'s specs if it is to share the screen successfully with other applications. Microsoft is currently in the process of rewriting all of its applications software to run under *Windows*. Several other major software developers are following suit. It is the beginning of a new wave of products that will offer *Windows*-specific versions.

What the software publishers give up in speed and uniqueness today, they will regain many times over tomorrow. They will reap a harvest of compatibility with future graphics cards and output devices. Software companies have been working too hard on hardware compatibility: It's time for them to hand off to Microsoft and the hardware manufacturers.

Think about it: A new laser printer comes on the market. It does everything from letter quality to 600-dots-per-inch graphics at 20 pages per minute for a thousand bucks. You order 50 of them for your company. Now all you have to do is convince 25 different software vendors that they should support this new miracle. If these products ran under *Windows*, you would need one driver. The printer company could write it. Once. The graphics card situation is much the same: You're using a standard color/graphics adapter today, and a \$149 knockoff of the IBM Enhanced Graphics Adapter comes out tomorrow. A quick reinstallation of *Windows* for the new board and you're in business. All your gray-on-black graphics blossom into 16 vibrant colors.

### LEARN THROUGH REPETITION

I don't mean to be tiresome, but here, once again, is the bottom line: Device drivers are the province of the operating system,

not the applications program. It doesn't matter what hardware you have if you have the right operating-system software.

This is the main reason for the optimism among compatible manufacturers. They

stand ready to produce (some already are producing) the faster machines necessary to shoulder the greater burden. A better operating system will do some things slower, but in the end, we'll all come out ahead. ■

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A complete installation program is included to remap any of LSE's 48 keyboard functions. Menus, prompts, help messages and default file extensions can also be customized for individual user preferences. \$125.00.

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CIRCLE 113 ON READER SERVICE CARD

The Toolbasket functions eliminate the need for extensive use of assembly language when interfacing with TopView. The Toolbasket's library includes functions to control window, cursor, pointer, and printer operations. It also provides access to TopView's cut-and-paste facilities and offers debugging services.

The Toolbasket runs on the IBM PC, XT, AT, and compatible systems with 256Kb memory. \$250.00. Binary and source code is available for \$500.00.

## LATTICE CREATES C COMPILER FOR COMMODORE AMIGA

Amiga C, produced by Lattice for the Commodore Amiga, supports the Amiga's 68000 microprocessor and offers the same high speed and extensive capabilities of the MS-DOS Lattice C compiler currently used by more than 30,000 software developers worldwide. Available from both Commodore and Lattice. \$300.00.

In addition, Lattice also offers cross compilers that allow you to develop Amiga programs on MS-DOS or UNIX systems.

Contact Lattice, to discuss your programming needs. Lattice provides C compilers and cross compilers for many environments including Tandem, Sony, Hewlett-Packard, Tandem, and IBM Mainframe. Corporate license agreements available.

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In fact, we've found that a good diskette manufacturer simply manufactures a good diskette, no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality. The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits. But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

### How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers. Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new IBM diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAH, Polaroid and many, many other familiar diskette brands. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices, without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications... specifications which are higher than most... and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are used in multiples of 50 only. Diskettes are shipped with white Polymex-impregnated cardboard sleeves reinforced hubs, user ID labels and write protect tabs.

### Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting. We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They wait it to work time after time, every time. (Especially trying to get you, the computer user, to use their diskettes.)

Instead, they concentrate their efforts on turning out the highest quality diskettes they can... because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them... and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they wait it to work time after time, every time. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

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## ■ THE NORTON CHRONICLES ■ PETER NORTON

# AN IMPERFECT B&W MONITOR



*Although Norton prefers black-and-white screens that permit black-on-white inverse video, Roland's MB-142 display has too many drawbacks to make him give up green.*

I've always had a fondness for display screens that glow white rather than the ubiquitous green or that European favorite, amber. I'm even more fond of white-phosphor screens that work in inverse video, with black characters on a glowing white background.

Computer screens like that are rare, although Apple's efforts with the Lisa and Macintosh computers have made them more familiar. In the PC arena, no white screens have been available, as far as I know, until recently when the Los Angeles-based Roland introduced its MB-142 character display, designed as a replacement for the IBM monochrome display. When I found out about the display, I was keen to try one.

The idea behind Roland's display is a good one, and the display has a number of nifty features. For example, the display allows you to switch between normal mode (white-lit characters on a black background) and inverse mode (black characters on a white-lit background). The ability to switch between normal and inverse characters is nice just as a matter of preference, whether momentary or permanent.

The color of Roland's display, white with slightly bluish-gray overtones, is pleasant to look at. It fades out in an orange-brown color that's surprisingly nice, too. Everyone I showed the screen to, including my wife, remarked favorably on the interesting color of the screen as it faded out. While a noticeable lag in the time it takes for screen images to fade would seem to be an obvious drawback, people actually appreciate it.

In addition, there's almost no noticeable flicker across the screen in inverse mode. This lack of flicker becomes very important when you're working on a screen with a lit background. If the background on a screen flickers, even subtly, you're almost certain to be in for eyestrain and headaches during a full day's work.

**A HARD TIME ADJUSTING** One of the biggest problems with the Roland Monitor is that unlike the IBM monochrome display, the Roland has an adjustment for horizontal position that will slide the information on the screen to the left or the right. If this adjustment is off, you can lose one or two characters of information from each line on either side of the screen.

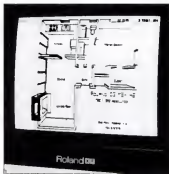
Normally this left-right adjustment wouldn't be any problem, but with the Hercules Graphics card, the character mode was shifted to the left and the graph-

ics mode to the right by a significant amount—about as much as the screen could adjust, from the extreme on one side to the extreme on the other.

If, like me, you switch among a variety of programs, some of which take advantage of the Hercules graphics mode and some of which don't, this shifting becomes a real problem. You shouldn't have to adjust your screen for each program you run. But that requirement would be tolerable if the adjustment knob were conveniently located on the front of the monitor. It isn't. The designers of the monitor have assumed that you don't need to fiddle with it all the time. Moreover, this screen-alignment problem has nothing to do with the inverse mode; it applies whether you're in normal or inverse mode.

However, for the majority of PC users who just have the standard monochrome adapter and don't get into graphics, adjusting the monitor is no problem at all, since you'll only need to adjust the knob once. But for any of you who benefit from Hercules graphics (or from any other monochrome graphics adapter, such as IBM's Enhanced Graphics Adapter), this flaw makes the Roland white-screen display a real nuisance. To me it's a severe enough problem to rule out the Roland screen for anyone with a monochrome graphics card.

**THE INVERSE MODE** What the Roland monitor is really all about is its inverse-video mode. However, several problems crop up with the inverse mode. The biggest disappointment is its lack of an "overscan" border area. If you're in in-



*Inverse mode on Roland's MB-142 monitor.*

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## ■ THE NORTON CHRONICLES

verse, you need the white background to extend beyond the working edges of the screen, into what's called the overscan area. Much to my disappointment, the Roland's overscan is almost nonexistent. If you're looking at information at the edge of the screen, you're staring at a black edge that's hard on the eyes. This lack of a border is as unpleasant as unprofessional-looking as a typed sheet of paper with no margins around the edges.

It's also worth mentioning some curious side effects of the inverse-video mode. On the minus side, there's no bright screen attribute in inverse mode; when programs set characters to show bright on the screen, you can't distinguish them in inverse mode (but a push of the button, switching back to normal mode, reveals the brights). When the bright screen attribute indicates vital information (rather than just being a frill), the inverse mode is a real drawback. On the other hand, the "bold" display looks wonderful in reverse video and works even

land display, such as the fact that you can't crank the screen up very bright. But I won't go into all of them now.

**FINE-TUNING** When playing around

with the Roland monitor, I was struck by the remarkable subtlety of the art of fine-tuning a program's display—even though it's a lesson that I've learned several times over as a PC software developer. If you've

Instead of this... ...you can have this with this!

**\*\$14.95**

■ On the Roland in inverse mode, bold display looks fabulous. Unfortunately, it works only in the graphics mode.

better than normal mode. Bold display is used by programs such as Lotus's 1-2-3, Microsoft Word, and Ashton-Tate's Framework, which use the monochrome graphics mode. Instead of showing brighter characters, they draw the characters with thicker lines for a bold effect. I generally like bold display, but I've never been thrilled with its quality in normal mode. But on the Roland in inverse mode, bold display looks fabulous. Unfortunately, it works only in the graphics mode and, as I pointed out before, switching between the Roland's graphics and character modes is a problem.

I have a few other gripes with the Ro-

land display, such as the fact that you can't crank the screen up very bright. But I won't go into all of them now.

It's also worth mentioning some curious side effects of the inverse-video mode. On the minus side, there's no bright screen attribute in inverse mode; when programs set characters to show bright on the screen, you can't distinguish them in inverse mode (but a push of the button, switching back to normal mode, reveals the brights). When the bright screen attribute indicates vital information (rather than just being a frill), the inverse mode is a real drawback. On the other hand, the "bold" display looks wonderful in reverse video and works even

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CIRCLE 165 ON READER SERVICE CARD



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ever developed and then really polished a program for the PC, you've spent time working out the fine points of making the information you display look its best. That process involves figuring out the best way to use the display screen's facilities so as to get the most out of color choices, flashing characters, bright and inverse-video characters, and so forth. You must restrain yourself, too, and take care not to overuse fancy display features.

We tend to think that the use of display attributes might be pretty much the same in any program, but they're not. You need

■ As much as I'd love to work with white, especially inverse white, the problems with the Roland monitor are just too great for me—though they might not be for you.

only take a few programs that really use the screen well and try them in inverse, or black-on-white, mode to see the difference for yourself. I found, when trying this, that lots of programs I thought were great in normal mode didn't look so sharp in inverse. Things aren't just reversed in inverse mode—they're changed in subtle ways. And if a programmer were optimizing a program for inverse mode, he or she would have to make different choices about how screen attributes were used.

You just don't appreciate the subtle programming required to perfect the appearance of a program until you try looking at it on a different kind of screen—like Roland's inverse mode screen.

**STILL STUCK ON IBM** I rather like the Roland white screen with its inverse mode, and I've been trying to convince myself that I like it even more by using it to write this column. But when I finish, I think I'll switch back to my trusty old IBM mono-

chrome monitor. As much as I'd love to work with white, especially inverse white, the problems with the Roland monitor are just too great for me—though they might not be for you. I've tried lots and lots of

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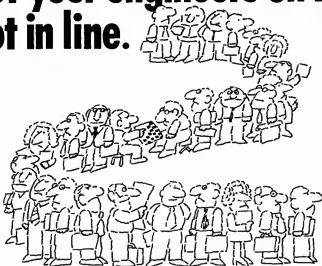
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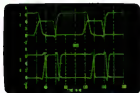
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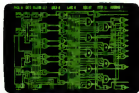
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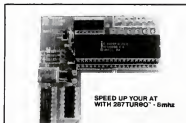
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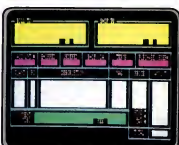
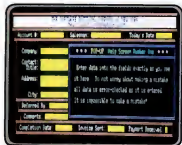
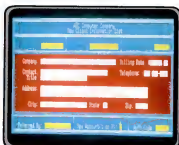
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■ PC PERSPECTIVES ■ JIM SEYMOUR

# UNBUNDLING SOFTWARE SUPPORT



*Everyone has complaints about the current system of after-sale software support. While no one has come up with the perfect solution, third-party support may be one answer.*

You can pay 'em now, or you can pay 'em later.

The principle applies well beyond the grinning auto mechanic in the TV commercial, who uses it to sell us more oil changes. Increasingly, it's going to apply to after-sale support for PC software.

We all know what's wrong with the current approach to after-sale support for buyers of popular PC programs: (a) The damn 800 number is always busy; (b) If it's not an 800 number, it's *still* busy all the time—and you have to pay for the call; (c) The people who answer the phone aren't very knowledgeable; (d) Many firms have a "call-back" policy—rather than dealing with your problem when you call, someone is supposed to "call right back" to help—but that call always comes long after you've solved the problem yourself or simply thrown your hands up in frustration; (e) All of the above.

Actually, that generalization is far too broad and thus unfair. I spend a fair amount of time on the phone with software vendors' support people, always anonymously, and frequently find knowledgeable, articulate people on the other end of the line.

And though the proportion of calls I have to pay for to free ones seems to have increased a good deal over the past year or so, I also suffer through fewer endless holds listening to the Silicon Singers' stirring version of "The Shadow of Your Smile."

Still, after-sale phone support for software isn't what it ought to be—or what it could be.

The problem is complex and reveals how far off we are when we try to describe what's wrong with the system symptomatically. What's really wrong with telephone support for software users hasn't got a thing to do with 800 numbers, terminally busy phone lines, or half-trained support people.

The real problem is that software companies see support as what the MBAs like to call a cost center, not a profit center. In other words, a drain on corporate resources, not an opportunity to turn a buck. And because deep down they consider after-sale support almost as unimportant as they consider documentation, in a time of shrinking profits and fierce pressure to cut costs, the support shop is always first to feel the knife.

A number of vendors are already charging for support calls. MicroRIM, Samna, MicroPro, and others have in place or have announced plans to start a policy of charg-

ing customers on a subscription or per-call basis for telephone support, usually after an initial getting-started period of 90 days or so. Others have been charging for some time.

Unfair? I don't think so. Software vendors have a number of arguments, some good and some embarrassing, for charging us for that continuing support.

**VENDORS' ARGUMENTS** Here are some of those arguments, from the reasonable to the ridiculous:

"Software support is very expensive, and only those who're going to use it ought to have to pay for it." Absolutely right.

"With our new release, we've put in such good, context-sensitive on-line help and made the program so easy to use, most people won't need to call." Well, maybe. Sounds a lot like Argument 1 to me, but fair enough.

"With our relatively mature product and stable or declining revenues, we just can't afford it." Is that the software business's way of announcing liquidation time? With hot new programs like Q&A, Paradox, Javelin, and Freelance coming out—all offering free on-line support—companies reining in support as an economy measure are really confessing their lack of faith in the future of their products.

"Most calls just ask for things people are too lazy to look up in the manual." True, but largely irrelevant: A lot of those folks don't know what to look for in the manual when the printer won't stop between pages so they can put in single sheets. They may not even know that the



Illustration: Mark Penberthy

## ■ PC PERSPECTIVES

answer is, or ought to be, found in the software documentation. ("That is a printer problem, isn't it?")

"People keep asking the same questions over and over." Also true, but

doesn't that say something about the program's documentation . . . and maybe the program itself?

And that all-time hit, "People ought to go to their dealers for support." You're

kidding, of course. What dealer? Those highly touted "authorized dealers" whose staffs haven't yet figured out how to run the product demos, let alone how to work the program?

**UNBUNDLING SUPPORT** Whatever the reasons, the trend toward separating (or "unbundling") the price of the product and its subsequent support is well under way and unlikely to be reversed anytime soon. What's really interesting, though, is where all this is inevitably leading: toward independent, third-party software-support vendors.

And that's happening precisely because of that myopic cost-center-versus-profit-center perspective of most software publishers. As long as software vendors figure

■ Third-party software support is a good deal for users, even if we have to pay for it.

they can only lose money on support, how high do you think improving support is going to rank in their priorities?

Put a reasonable profit opportunity into the equation, however, and the picture changes dramatically. And since no one's going to make a profit on slow, rude, inaccurate telephone support services, independent, third-party software-support firms are going to have little choice. They'll do it right, or they'll file for Chapter 11.

Third-party software support is a good deal for users, even if we have to pay for it. The idea isn't new. But making money at it will be. Susan Hamlin ran MicroSupport in Sausalito, California, for a while last year, but her limited capitalization ran out before MicroSupport could build a sufficient customer base. And John Commando offered third-party software support through InterSol in Braintree, Massachusetts, for a couple of years on a subcontract basis for some very well-known computer and software companies. He decided to get



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## ■ PC PERSPECTIVES

out of the business 3 months ago.

"It's going to take someone with deep pockets and lots of patience," Commando says. "But it has to come. The economics of scale, avoiding the up-and-down work-

load and staffing requirements, knowing what support is going to cost in advance all make so much sense for software vendors."

Yep.

"Beyond that, consider who's really tending the phones most of the time at a lot of software firms. How do you quantify the value to those companies of getting their programmers off the phones and back to developing new products?"

Exactly. Writing and selling programs is a much different job from teaching people how to use them. And teaching people how to use that disk for which they've just spent a few hundred bucks is a great chance for someone to make a buck—as long as it's not the software vendor.

If we buy *SpreadStar* from MegaSoft, we figure they owe us free support for at least a year or so. But if that support's not there (and that's reflected in the reduced price we pay for the product), we're going to be open to buying some support, at least for a while, as we learn the program.

**WHAT PRICE?** The imponderable in all this, of course, is just how much we are willing to pay for support. And how we want to pay. By the call? At so much per minute, or per answer? On a subscription basis, allowing unlimited calls for a year? Or by prepaying for a maximum number of calls?

The people who figure that out are going to make a bundle. "I think third-party support is going to be a lot more interesting to smaller software companies than to bigger ones like us," says Tom Meadows, executive vice president at BPI Systems Inc., the accounting software company. "But it's a wonderful business opportunity, and the entrepreneurs are going to have a field day with it."

Commando agrees. Provided those entrepreneurs have deep enough pockets to build their market. Although he opted out of the game, Commando's cheering them on because he still stands to make a buck: InterSol developed a call-tracking database system for managing and analyzing support calls that's so good, software companies were more interested in buying that program for their in-house support shops than in farming support out to InterSol.

So Commando's selling the Multiuser/networkable version of the program, *TSM/The Telephone Support Manager*, at \$5,000 a copy.

Should we call that after-sale support of after-sale support? ■



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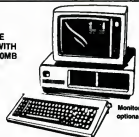
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InfoWorld on EasyLAN  
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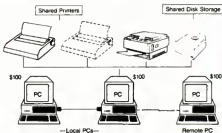
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## EasyLAN Office Network

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## ■ COMPUTERS IN SOCIETY ■ STAN AUGARTEN

# TECHNOLOGY WITH A SMALL "t"



*A new technology doesn't just appear overnight. It subtly eases itself into society through side roads and back alleys. Here are four examples of the process in the works.*

We tend to think of technology with a capital T, as if it were a vast and impersonal force sweeping over society like a flood. But the invention and proliferation of new technology is really a subtle and personal process, a changing of old lamps for new that occurs in a million different places, times, and ways.

For example, an engineer in a huge electronics company hits upon an idea for a new gadget and builds a mock-up; the company's new-product committee, composed of the president and vice presidents of marketing and engineering, decides to put the thing into production; the trade press gives it favorable reviews; stores and mail-order outlets all over the country decide that they'd like to carry it; and thousands of people buy it. Slowly, as a result of a countless number of small decisions, a new technology insinuates itself into the world.

It's easy to generalize about technology, but reality is far more complicated, unpredictable, and quirky than any theory can possibly convey. Sometimes the best thing to do is to simply sit back and observe. However, it's not like watching the evening news; the process isn't at all dramatic, headlines aren't made, and history isn't changed—except in the long run. It's technology with a small t, seeping into the nooks and crannies, into the side roads and back alleys of the world. Keeping that in mind, I'd like to describe four unusual (but despite their atypicalness actually quite typical) episodes in the ongoing history of computers.

**FISH-CATCHING TECHNOLOGY** If you haven't seen a fishing rod since your days in summer camp when the best that fish-catching technology had to offer was a stainless-steel reel on a laminated stick, then I'm happy to inform you that the state of the art has advanced considerably. For you can now not only buy a computerized sonar to help you zero in on elusive schools of fish—such sonars have been around for years—but you can also get a computerized fishing reel. That's right. A computerized fishing reel. There's a description of one in the spring 1985 catalog of Cabela's, a big supplier of camping, hunting, and fishing gear based in Sidney, Nebraska.

The reel is made by Daiwa, a division of Seiko, the Japanese conglomerate best known for its watches. The reel is made out of black, anodized plastic and aluminum, with titanium, and it costs \$139.95—about 50 bucks more than a traditional (noncomputerized) top-of-the-line

reel. At first glance, it looks like a typical fishing reel, with a spool for the line and a two-pronged handle for wheeling in the line. But the computer sets it off from other reels. About the size of a small box of matches, the computer looks like a small digital clock. It's affixed to the top of the reel, just in back of the spool, and has a liquid-crystal screen and a few buttons.

The device seems easy to use. All you have to do is enter some basic information, such as the length of the line, and the computer automatically calculates the length of your cast and the speed of your retrieve. It also emits an electronic beep for every 10 feet the line moves in or out of the reel.

My first reaction to the thing was that it was an unsporting idea, a snazzy gadget that does more for the manufacturer's bottom line than for the ancient sport of angling. But I called up Daiwa, whose U.S. headquarters is in Glendale, California, and talked to an executive about the reel. He said that it is very useful for "deepjugging," or fishing in deep lakes and rivers; used in conjunction with a graph recorder (a fish-locating sonar), it will help you position your hook at just the right depth. He's used it several times, with good results. And fishermen obviously like it, he said, because they've bought thousands of them in the past year and a half.



**FINGERPRINT READERS** Alameda County, one of the most heavily populated counties in the San Francisco Bay area, has devised a new way to keep tabs on people who have been sentenced to house arrest.

Starting early next year, the county will



## ■ COMPUTERS IN SOCIETY

give each prisoner an electronic fingerprint reader made by Identix Inc., a Palo Alto, California, company that invented the gadget about 10 years ago under contract with the FBI. (There's a small market for Identix's fingerprint readers in government and industry, where they are used to restrict access to computer systems or research labs.)

In the Alameda scheme, a computer will dial the telephone number of a person

under house arrest and play a recording that requests him to identify himself. The felon must thereupon insert a finger in the Identix reader, which is hooked up to the phone; the reader scans the print and compares it with the one in the computer database. If the prints don't match or if the felon has failed to comply with the recorded request, the computer notifies the police and an arrest warrant is issued. It's an ingenious idea and should help ease overcrowding in the Alameda County jail.

**PHOTON WARS** If you've ever wanted to engage in the kind of ray gun shoot-em-ups that Luke Skywalker and his pals play in *Star Wars*, you'll soon be able to do so—without traveling to another galaxy.

An electronic battlefield for a game called Photon has opened in Kenilworth, New Jersey. Housed in a huge room crisscrossed with catwalks and shrouded in mist, Photon is played in teams with up to ten players on a side. Each player gets a photon pistol, a power pack, a vest, and a helmet; the object of the game is to kill the enemy and capture the other team's base station. Every hit with a photon pistol scores a specified number of points, and every shot produces a marvelous sound effect in each helmet's speakers. A microprocessor in each vest keeps track of the hits, and a computer tabulates the scores at the end of every 6½ minute game.

It costs \$3.50 to play a game of Photon, which was developed by an imaginative entrepreneur from Dallas by the name of George Carter. A mechanical engineer, Carter hopes to open 70 Photon centers nationwide; in addition to the center in New Jersey, 3 more will be in operation by the end of the year. "There's always a new sensation just around the corner," said Carter, "and we think this is the next one. We're targeted to the yuppie market, but we think we'll have a broad base of appeal." He's wrong, of course; most players will probably be teenagers.

**BBS FOR THE MASSES** A group of hackers-cum-social activists have established an unusual computer bulletin board in Berkeley, California. The activists, who belong to an organization known as the Community Memory Project (CMP), have installed three terminals in several popular

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## ■ COMPUTERS IN SOCIETY

Berkeley hangouts—La Pena Cultural Center Cafe, the Whole Earth Access store, and the Telegraph Avenue Co-Op supermarket—where anyone can use them during business hours. But you can't ac-

cess the system with a modem; the bulletin board was set up strictly for people who don't own a computer or who don't have access to one. In other words, it was set up for John and Jane Q. Public.

CMP was established by Lee Felsenstein, designer of the Osborne portable computer, and two colleagues. It has about eight or nine active members and is financed by royalties from two software packages, including the bulletin board program, which they wrote and licensed to commercial software companies; the royalties bring in about \$40,000 a year. The bulletin board is a technically interesting piece of software because it has an elaborate keyword system that enables a user to make a thorough canvass of all relevant entries and to make comment upon comment almost ad infinitum.

But the social aspects of the bulletin board are much more interesting than the technical ones. At heart, the bulletin board is an exercise in untrammelled freedom of speech. There is no gatekeeper to decide who may or may not use the system, no censor to purge the board of offensive remarks. Anything goes. So, in between the notices about cars for sale and apartments for rent, there are the goofy, the touching, the bizarre, the comical. Here's a small selection from the board:

"Reality fabric is a myth. The past is gone, the future hasn't begun, and the present is fast disappearing . . . Feel the waves bear you over a powerless sea. Peer deep into its depths and find meaning. If meaning is created, then it is."

"I have a collection of smells in test tubes. If you would like to trade with me, leave a response or check for messages with the index word SMELLS. My name is Ray."

"Unhappy with present status of life! Cannot find any desirable women, not a one. Life is dull! I'm sick of Berkeley lesbians, what should I do? I'm straight, a young 40, very sensitive, and totally unable to cope with modern day society. Is there any alternative for me?"

The bulletin board has been in operation for about a year. It's begun to receive some attention in the local press, and about 1,200 people use it every month. CMP hopes to install several other terminals in Berkeley, particularly at the University of California, and to defray its costs by attaching coin boxes to the terminals and charging a dime or so for each entry.

Free speech has its price after all, even in Berkeley. ■

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# T ■ A ■ P ■ E

# BACKUP

## MEASURING SPEED & COST PER MEGABYTE

**T**ape backup is like an insurance policy. Everyone agrees that it's a good idea, but few know how to use it to its best advantage or even how to buy one. Both tape backup and insurance are based on the proposition that sooner or later something terrible is going to happen. You can pay now or pay later. Prudent business practice dictates that you pay now, because later will invariably be much more painful and much more expensive.

What is the real price of tape backup? The acquisition cost of the unit? The time that it takes to perform backup? The cost of the media? How do you determine which unit fits your needs best?

In this comparison test, PC Magazine Labs looked at two basic measurements: speed (see the benchmark test results) and cost per megabyte (see

the features table). All the other criteria, such as tape format and ease of use, fell out naturally in the course of describing the units as we tested them. We tested 13 units: Alloy's PC-60, Cipher's 5210, Genoa's Galaxy 3260 and 3220T, Hewlett-Packard's HP 9142A, I<sup>2</sup> Interface's I<sup>2</sup>TAP10 and I<sup>2</sup>TAP45X, Lintec's LI-60685, Maynard's MaynStream 20, Micro Design's M10, Sigma Designs' SWS-0060, Sysgen's QIC-File, and the Tecmar QIC-60H. Our test units

were connected to identical PC-XTs, with 256K bytes of RAM, a 10-megabyte hard disk, and serial and parallel ports.

There isn't much point in getting more backup capacity than you have disk storage, and you might think that our cost-per-megabyte criterion unfairly favors units that seem to offer no more than a longer tape. That may be true now, but with the plummeting prices

*PC Magazine Labs tested 13 tape backup units, focusing on speed and cost per megabyte. Ultimately, the system that most impressed the editors was the one with the best software.*



## ■ TAPE BACKUP

of 20- and 30-megabyte drives, you may kick yourself if you don't plan for more capacity.

There are differences in the way the drives for the higher-capacity units are engineered as well as software differences. Upgrading your tape system may not be possible later. The units we tested were similar in that they were self-contained outboard units, without integral disk drives. In most cases, they are the most attractive choice for the user who already has a hard disk. None of the units tested use the new PCT format. Look for a comparison test of PC/T units in an upcoming issue. We will also be reporting on two other categories: internal backup units (for installation inside your machine) and combined tape/hard disk expansion units.

We found considerable variety in the units we tested, both in tape format and connection method. The simplest units attached directly to the 37-pin expansion connector on the XT's floppy disk control-

ler card. The rest had simple parallel interface boards, or even full-featured tape controllers, on half-size cards.

Gone are the full-length adapter cards crammed with chips. Advancing technology has consigned them to history. Both the size and complexity of the adapter card can be important issues. A unit with no adapter card can simply be taken from one XT to another to perform backup. Of course, the PC AT doesn't have the 37-pin connector, so this type of unit is suitable only for XT's and compatibles unless the manufacturer makes an AT adapter. Units with small, simple adapters generally have them inexpensively available separately from the tape unit. You can equip each XT with one, then use one tape unit to service the backup needs of an entire department's computers. A half-length card is always welcome in an XT.

Two factors make or break a tape backup unit. One is speed and the other is painlessness. It has to be fast enough so that



## EDITOR'S CHOICE

*Sysgen's QIC-File is our hands-down choice for the best of the units tested. It's not the fastest or the cheapest. But it has the best software, and that's what counts. Sysgen's unique automatic backup goes into action every time you power up your machine. You determine the backup criteria, and it works quietly in the background, preserving your files and keeping you from disaster's door. Genoa's Galaxy 3260 is our second choice, with an attractively low cost-per-megabyte and a handsome, informative user interface.*

you don't resent the time it takes to back up. It also has to be easy. Bad software will kill an otherwise good product. The amount of time it takes to restore files is immaterial because it is invariably less than the time it takes to rebuild a crashed hard disk. Virtually all the products tested here are incompatible with one another. They use different media, different formats, and different file-handling techniques. Each manufacturer is sure that its approach is the best and can defend it. (See Craig L. Stark's article, "Tape Backup: Technologies in Competition" for a full discussion of formats and media.)

**BRASS TACKS** We thought our test was going to be over before it began. The first several units out of the boxes didn't work. As is the way of all things electronic, we had to invest several man-days in them before we could determine that it was them, not us.

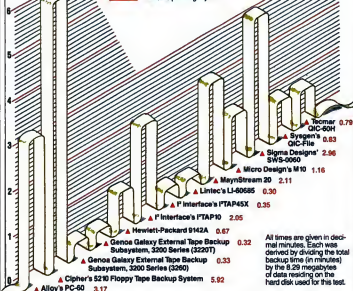
The company finally put a couple of its top system developers on a plane and sent them to PC Labs. They found a manufacturer's nightmare: a timing bug dependent on individual machines. None of their machines showed the symptoms; all of ours did. They spent the weekend rewriting their drivers. We can attest, finally, to the quality of the finished product.

Fortunately, the other products were more tractable. For the most part, how-



## BENCHMARK TEST

**Tape Backup**  
Minutes per megabyte



Effective tape backup operation must be fast, but ease of use factors in heavily, too. Notice that the two fastest units tested didn't get our vote for Editor's Choice.



er, our testers felt the software was too difficult to use and generally didn't do all the things that a user really wants. The more we tested, the more sure we became that ease of use was even more important than speed when backing up. In fact, our overall Editor's Choice unit, Sysgen's QIC-File, gets the nod because its automatic backup software puts it in a class by itself.

In the dawn of tape backup—say, 2 years ago—the file-by-file versus image backup issue was critically important. The former was slow but reliable; the latter, fast but fraught with potential problems if you reformatted your disk or tried to restore onto a different hard disk, one with a different pattern of bad sectors. Advancing software technology has now blurred the distinctions, all but eliminating the differences. For example, I<sup>2</sup> Interface's backup system notes bad sectors on your hard disk by first examining the file allocation table (FAT). It then performs an image backup, copying your data on a track-by-track basis. If you restore to a different drive, one with different bad sectors, it rebuilds the files on the new drive file by file, allocating space for them from the new drive's FAT.

**FINAL EXAM** To wring out our test units, we loaded our testbench XT's with all of DOS 2.1's files, then built a large (2 megabytes) file and several small files. We also created a subdirectory with a copy of the large file and all the small files in it. This environment represents the way many hard disk users fill their machines: one or two copies of a large, valuable database and a bevy of small files of indeterminate value. Prudence says to back it all up. You can sort the wheat from the chaff after disaster strikes. It's also important to be able to back up or restore one subdirectory's files. After all was said and done, we had a daunting array of performance measurements and price-per-megabyte figures. You can see our picks in the accompanying tables and individual product reviews. Feel free to interpret the data your own way, but remember: Your hard disk is wearing out, even as you read this. Each time you turn on your machine, it creeps closer to its inevitable demise. Death and taxes are just as inevitable for PCs as for you.—Bill Machrone

## ALLOY'S PC-60

Alloy Computer Products' new PC-60 is its low-end entry into personal computer tape backup. Despite its low price, it has a full range of features and handles DC600A cartridges, for a capacity of 60 megabytes.

You plug the Alloy PC-60 into the 37-pin connector on the rear of the disk drive and go. What could be easier? Not much from the hardware side. The PC-60 projects an image of serenity—no screaming sounds on the high-speed winds, just quiet shuttling of the tape as it backs up and restores your files. The PC-60 uses a tape directory on track 1 of the tape, so you don't have to wind through the entire tape in order to read its directory. This is an advantage if you need to restore a single file: The PC-60 locates it in the directory, then proceeds to the file's actual location on tape to begin reading. It can find any file in 2 minutes or less.

The PC-60's software is a bit of a mixed bag. Some screens are very helpful, such

as the one that precedes formatting a tape. You have a choice of formatting from 2 to 12 tracks, and the display tells you just how long it'll take. Why would you want to format just 2 tracks? If that's all the disk you have, you don't have to incur the considerable time overhead of formatting the entire tape. It takes 14 minutes to do 2 tracks and 72 minutes to format the full 60 megabytes. You can add more formatted tracks later and append files to the tape without erasing the existing files. On the downside, the command structure for issu-



### FACT FILE

#### PC-60

Alloy Computer Products  
1000 Pennsylvania Ave.  
Framingham, MA 01701  
(617) 875-6100

List Price: \$995 for the XT version; \$1,190 for the AT version  
Requires: 256K RAM.

CIRCLE 688 ON READER SERVICE CARD

**ALLOY's** PC-60 unit features several convenient features. The tape directory is stored on track 1 of the tape, so you don't have to scroll through the entire tape to read its directory. Also, you can format anywhere from 2 to 12 tracks at a time, so you can save time by formatting only those tracks you need.



## ■ TAPE BACKUP

ing backup commands is irritating. An uppercase *B* tells the PC-60 that you want to back up all files on the disk, while a lowercase *b* means that you want to back up specific files. To make matters worse, both commands can be modified by slash commands. Restore commands are similarly confusing. With so many nice features, it's a shame that someone didn't spend a few more days on the user interface and put together a nice menu-driven system.

On the plus side, once you've figured out the command syntax, you can issue any of the PC-60's command repertoire from the DOS command line, which means that you can put the backup commands in a batch file. This is advantageous for end-of-the-day unattended backup. The append feature is nice if your particular data processing religious sect believes in updating backup tapes. The append process identifies each backup with a unique session number that appears in all subsequent directory references. You can back up from specific session numbers but be aware of the possibility of multiple files on the same tape with the same name.

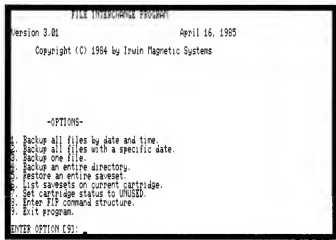
Throughout the test period, the PC-60 was a trouble-free performer. It installed effortlessly and performed flawlessly. Since it runs from the floppy disk controller's expansion port and can handle up to 60 megabytes, I would recommend it as either a departmental or standalone backup system.—Bill Machrone

## I<sup>2</sup>s I<sup>2</sup>TAP10

I<sup>2</sup> Interface Inc.'s I<sup>2</sup>TAP10, a cartridge-based 10-megabyte tape backup subsystem, is reasonably priced at \$995. It offers reliability, a certain amount of flexibility, and relatively hassle-free use. While not among the fastest tape subsystems tested, its speed is well within acceptable limits.

The I<sup>2</sup>TAP10 connects to the floppy disk controller port, making its installation easier than that of most other tape subsystems. However, the use of the floppy controller card also predicated a maximum transfer rate of 250,000 bits per second and compatibility with only those computer

**MENU**—driven software for the I<sup>2</sup> Interface I<sup>2</sup>TAP10 drive makes available several backup options. Choosing one is as simple as a single keystroke.



systems that have that external port.

Both the tape drive and its software are by Irwin Magnetic. The I<sup>2</sup>TAP10 uses either 3M DC1000 or IRWIN TC 200 mini-cartridges. The system software consists of three programs: Tformat, FIP (file interchange program), and ImageIBM. Tformat provides the utilities for servo writing, formatting, and certifying your tape; ImageIBM backs up and restores a complete image of the hard disk; and FIP performs file-by-file operations. All of the programs have their own menus and come with their own documentation. Be sure to check the printed documentation against the documentation on the disk; in the one I tested, the versions were different.

Before you use a tape, it must be servo written to set up the formatting parameters. Tapes are formatted to eight tracks per tape, 15 blocks per track, eight sectors per block, and 1,024 bytes per sector. The actual formatting time took 16½ minutes. If you display the tape's parameters, you will be shown the date formatted, the volume's name, the data's status (whether it is an image or file backup), the date of the last change, the number of bad blocks (if any), the location of the first free block, the number of bytes available, and the percentage of the tape used.

Because the I<sup>2</sup>TAP10 uses the floppy controller card, it assumes that DOS is transferring a legal file. Error correction consists of a read-after-write scheme. If the data written is correct, it proceeds to the next record. If it locates a bad area on the tape, it automatically retries to write the data five times. If it is still unable to write at that point, it labels that section of tape bad and continues to the next.

PC Magazine Labs' image backup took 2.05 minutes per megabyte. Each backup is saved within a "saveset," the equivalent of a disk subdirectory. Unlike some of the other units, the I<sup>2</sup>TAP10 does not allow you to restore an individual file from the image. However, Interface does claim its unit can restore a disk image to any hard disk—even if both of the disks have bad sectors in different areas. Essentially, when performing an image backup, the software looks up the FAT and the last available cluster and then backs up only the data and the location of the bad and unused sectors. When it restores the image, it compares the two FATs; if there are any discrepancies, it corrects the destination's FAT and proceeds with the restore.

While I had occasion to test this feature (one of the other hard disks was mistakenly reformatted and I couldn't wait for the test-

ing programs to create the almost 900 files) and was able to successfully restore the image to another XT, neither hard disk drive had bad sectors. Presumably, there is only one situation in which the operation will not work, and that is if you are restoring a full 10 megabytes of data to a hard disk that has less than 10 megabytes of space available. Interface's technical support representative said that in such a case the program informs you that the saveset is too large for the disk.

The FIP program's menu includes six choices. The first three are for backing up or restoring individual files or an entire directory. The options include selecting files by date and by date and time; wildcards are supported in all cases. When backing up files with a specific date, the program automatically goes through all subdirectories and selects the appropriate files. The fourth and fifth menu choices provide a directory of the cartridge and permit you to overwrite the data on the cartridge.

The last menu choice allows you to enter the program's command structure. The FIP language consists of 18 commands.

Three of them allow you to toggle between the FIP prompt and DOS. Another 3 are concerned with opening, closing, and creating of savesets. Most of the rest allow you to select, back up, and restore files. When a command requires input, you are prompted.

FIP backs up only 200 files per saveset. If the directory or file selection contains more than 200 files, the program automatically creates enough savesets to contain them. However, this same elegant solution does not hold when restoring the savesets—that is, they are not chained. You

must specify each individual one for restoration. In addition, the subdirectory must be present. As a result of this design feature, restoration can be slow with this unit.

The unit has a few additional quirks. At one point, while attempting to restore some files I had just backed up, I was informed that the cartridge was not formatted. With the Tformat program, I got a status report that said 30.53 percent of the tape was used. I dutifully removed the cartridge, reinserted it, and retried the restore—it went flawlessly. At another point, the program would not back anything up after five savesets, claiming the tape directory was full. Only 35.2 percent of the tape was used, with 6.7 megabytes of space still available.

While the Irwin software is functional, it lacks a unified structure. People who use the backup software once a month or even once a week are not likely to remember the names and commands of the various programs. Interface should have integrated them into one master menu.

In spite of its minor quirks, I<sup>2</sup> Interface's I<sup>2</sup>TAPI0 is definitely worth considering if you have a number of XT's or PCs with hard disks that need reliable backup. However, if you also have an AT, a Compaq, and a few clones, you should look elsewhere. —Vincent Puglia



## FACT FILE

**I<sup>2</sup>TAPI0**  
**I<sup>2</sup> Interface Inc.**  
 21101 Osborne St.  
 Canoga Park, CA 91304  
 (818) 341-7914  
**List Price: \$995**  
**Requires: 128K RAM**

CIRCLE 003 ON READER SERVICE CARD

**EASY:**  
*I<sup>2</sup> Interface's I<sup>2</sup>TAPI0 drive connects directly to the floppy controller card. This makes the unit easy to install and to use, but holds the data transfer rate to a maximum of 250,000 bits per second. However, the I<sup>2</sup>TAPI0 is reliable: it uses the read-after-write error correction scheme to verify backed-up data.*



## HEWLETT-PACKARD'S HP 9142A

The HP 9142A tape drive system from Hewlett-Packard is a 60-megabyte streaming tape cartridge system that offers relatively fast image operations, slow file-by-file backup, the ability to define up to four volumes that act as drives, and an error-detection and correction technique that ensures reliability. In addition, the unit comes with a variety of software that makes good use of the XT's function keys.

Since the HP 9142A subsystem requires its own controller, installation simply means opening your XT, plugging in the card, and connecting the cable. The software installation procedure copies the

## ■ TAPE BACKUP

appropriate programs to the hard disk. However, the HPTAPE.MSG file must be in the current directory, although the documentation does not mention this. At the end of the installation program, you are given the option of creating a RAMdisk with as much as 128K bytes of your computer's RAM.

Once the unit is installed, you must format the tape by calling the *HPTape* program. While the formatting is in progress, you can exit to DOS and let the formatting continue in the background. Since formatting takes approximately 85 minutes, the ability to exit to DOS is more than a frill. If you try to reexecute the program while the program is still formatting, you are greeted with a "tape drive is busy" message.

After formatting, you need to assign the tape volumes. You can divide a 600-foot tape into as many as four 15-megabyte volumes, then name the volumes, which are also automatically assigned the DOS drive letters D through G. If used as a floppy, each volume can be made to store, manipulate, and execute files.

Although *HPTape* lets you rename the

volumes, format and reread the tape, and gives you on-line help, it is used mainly for image backup and restoring. The backup and restore operations are fairly straightforward. You select the source and destination from a multiple-choice list, then press F1. Since the HP 9142A has no facilities for reading a directory from *HPTape*, you must exit the program and use the *Fileman* program.

*Fileman* is devoted to individual file management. With it, you can perform most PC-DOS command operations. You can also expand or contract directory list-

ings. Backing up files consists of choosing the edit function, selecting the appropriate tapes, opting for the copy feature, positioning the cursor on the drive and subdirectory, hitting the Begin key, and reaffirming the copy procedure. During that time, the program must read the disk directory. Once copying begins, *Fileman* lists the files in descending alphabetical order in a column on the right-hand side of the screen. When copying files, the program displays the source path but not the destination path.

Although the speed of image operations is quite respectable, the *Fileman* file-by-file operations are ridiculously slow and tedious. The standard DOS COPY command works much more easily and is more elegant. *Fileman* also allows you to copy from one volume of the tape to another; however, the process is even slower than that of copying files from the hard disk to the tape.

One reason these file-by-file operations are so slow is that the software must return to the directory area to add the file data each time it copies a file. Another reason stems from the error-detection and correction techniques. The HP 9142A uses a 5-byte CRC code; it also uses a PC/T-like format, creating redundant records based on data from the two preceding records. Because of this redundancy, you do not have a full 60 megabytes for storage.

Two other points should be made. First, *HPTape* remaps the directory when performing a restore; therefore, restoring to another hard disk should pose no problem. Second, the program does not use the archival bit, which means you cannot select files by date for backup.

The HP 9142A may be many things, but fast is not one of them. Evidently, someone at Hewlett-Packard realized this and included the RAMdisk option. However, this is only a jerry-rigged solution, and many people may not be willing to devote RAM to act as buffers.

Other features suffer from other problems. *Fileman* allows you to search for files on the tape; however, this feature is about as useful as a pair of glasses to a blind man; a \*.COM query only returns the message that at least one .COM file exists in the highlighted directory. Also, not only did the FIND feature not report which

<b>PC</b> MAGAZINE	<b>FACT FILE</b>
<b>HP 9142A</b> Hewlett-Packard Co. 3000 Hanover St. Palo Alto, CA 94304 (415) 857-1571	
List Price: \$1,889 w/interface card	
Requires: 256K RAM, DOS 2.0 or later.	
CIRCLE 666 ON READER SERVICE CARD	

**HEWLETT**-Packard's HP 9142A tape backup unit uses a 60-megabyte streaming tape system. Its software includes a variety of useful programs, such as an up-to-128K-byte RAMdisk. It also gives you the option of dividing a tape into as many as four 15-megabyte volumes, each of which acts as a separate drive.



.COM file existed, but it did not state how many .COM files existed.

The documentation for the HP 9142A consists of two manuals, one for the controller and another for the unit itself. Both manuals are well illustrated and organized; they include a table of contents, an index, a glossary, a number of appendixes, and chapter tabs. In addition, they are liberally sprinkled with "hints"—including some that are quite obvious, like "You cannot use Image Copy until you have formatted the tape cartridge and assigned volumes." There is also a quick reference card.

I pity anyone who needs to call Hewlett-Packard for technical support. Because of the corporation's size and the number of products it markets, you might not easily find someone familiar with this product. Therefore, if you purchase a unit, make certain you know whom to call for technical assistance.

The HP 9142A should be considered in two cases: If you intend to do only disk image operations, or if you have a spare weekend to do a file-by-file backup.

—Vincent Puglia

## I<sup>2</sup>'s I<sup>2</sup>TAP45X

I<sup>2</sup> Interface's I<sup>2</sup>TAP45X tape backup unit is full of surprises. It offers only image backup of your hard disk plus a choice of image or file-by-file restoration. I<sup>2</sup> Interface has also come up with an innovative solution to the pitfalls usually associated with restoring a hard disk image onto a different hard disk.

The drive uses the QIC-24 tape format with either 300XL or DC600A tape cartridges. It is about half the height of the PC and about equal to it in length. The I<sup>2</sup>TAP45X runs from its own controller card, so installation on a standard PC-XT is easy enough but not as easy as with units that connect directly to the floppy disk controller. No tape formatting is necessary, but when you first insert the tape, the unit takes a few seconds to perform tape diagnostics.

The I<sup>2</sup>TAP45X's software can run from either the floppy disk drive or hard disk. It



## IMAGE

only is the rule with the I<sup>2</sup>TAP45X tape backup subsystem. This unit performs some of the fastest image backups on the market, and checks the file allocation of the hard disk to which data is being restored to make sure it does not corrupt good data by writing it over onto bad sectors.

offers you but a single backup option—image capture of your entire disk. When you ask the software to begin capturing your hard disk's image, it informs you that a temporary file is being created on the hard disk. Then, if it needs to, the unit automatically rewinds your tape. Once the backup actually begins, a handy little on-screen bar graphic tells you how far along in the backup the tape is.

Backing up a 10-megabyte hard disk image is fast—perhaps ten times faster than the average file-by-file backup. PC Magazine Labs timed an unverified image backup with the I<sup>2</sup>TAP45X drive at a lightning 0.35 minutes per megabyte of data. Adding in a disk/tape comparison, the total jumped considerably, but was still comparable to a verified file-by-file backup on most of the other drives tested.

Restoring the image was also a snap. The I<sup>2</sup>TAP45X was so much faster than the other tape drives I tested that I found myself relying on it whenever I needed to restore images quickly onto other hard disks. Some of its speed can be attributed to the I<sup>2</sup>TAP45X drive's unusual ability to verify image backups. Most other tape

## PC MAGAZINE FACT FILE

### I<sup>2</sup>TAP45X

I<sup>2</sup> Interface Inc.  
21101 Osborne St.  
Canoga Park, CA 91304  
(818) 341-7914

List Price: \$1,795

Requires: 192K RAM, DOS 2.0 or later.

CIRCLE 002 ON READER SERVICE CARD

drives are able to verify only file-by-file backups, a somewhat less streamlined process.

One of the usual pitfalls of an image backup is that it is like taking a snapshot of the disk, bad sectors and all. Problems arise if your disk fails and is permanently damaged, in which case your original hard disk image must be restored onto a different disk. The new disk may also have bad sectors, which, unless you are incredibly lucky, would be in different locations than the bad sectors on the old disk. When an image is restored from tape to disk, it is usually done without regard to where the new bad sectors are, so you are faced with

## ■ TAPE BACKUP

the possibility of corrupting good data by writing it to bad sectors on the new disk. To our surprise, however, an I<sup>2</sup> Interface spokesman informed PC Magazine Labs that the unit's image restore function takes bad sectors into account. The tape drive "looks at" the FAT (file allocation table) on the hard disk before doing a restore. If there are bad sectors on the disk, it notes them and avoids writing good data onto them when it overlays the image from the tape onto the disk. We could not garner conclusive evidence that the tape drive actually performed in this manner, though, because none of the IBM PC-XTs used for our testing contained any bad sectors on their hard disks.

If you make an image backup of your hard disk, it is especially important that you are able to compare the data on the tape with the data on your disk. The I<sup>2</sup>TAP45X software permits this option on its menu, aptly calling it Compare Disk/Tape. However, the comparison process is not nearly so neat and elegant as the I<sup>2</sup>TAP45X's backup and restore functions. Comparing disk/tape images is a stop-start process during which time the tape drive sounds like a heavy-breathing, obscene phone caller. As I mentioned, the I<sup>2</sup>TAP45X drive also offers the option of single-file restoration, which automatically includes verification. There is no option for a directory restore.

Other menu options allow you to display a directory of the tape (regular or wide) or to retension the tape within the cartridge, a process that takes about 2 minutes for a 300XL tape. The directory option displays only a single screenful of your directory at a time. When you hit a key to see more of the directory, the software completely rewrites the screen. Why its designers opted for this slow, unappealing method over a scrolling, DOS-style directory display is difficult to understand. The directory could also be improved by the addition of some indication of used and available tape capacity.

In general, I found I<sup>2</sup> Interface's I<sup>2</sup>TAP45X drive a pleasure to work with. I liked the speed of the image backup and restore and the apparent ability of the drive to restore the image to any hard disk. If the designers of this speedy little unit have truly solved the problem of image restora-

tions onto other hard disks (and PC Magazine Labs has no reason to believe they have not), then the I<sup>2</sup>TAP45X may just represent the shape of things to come in tape backup technology. —Joe Desposito

## MICRO DESIGN'S M10

Micro Design International Inc.'s M10 differs from most other tape backup subsystems in three ways. It uses microreels rather than cassettes or cartridges for storage; it allows you to mount the reel as drive D:—an extremely useful feature if your hard disk goes down and must be sent out for repairs—and it offers only image backup with image and individual-file restore.

The M10 is striking to look at. Black with light-gray sides, it resembles a finely engineered audio cassette system. The lightweight unit even comes with a handle that doubles as legs so that the system can be tilted to a comfortable angle.

Installing the hardware is as simple as connecting the cable to the floppy controller card. (Don't rule out the M10 because you have an AT or a Compaq; Micro Design offers a free adapter that connects its unit to the AT, Compaq, and a number of other compatible machines.) You then insert the microreels onto the door, close the door, and press the load button. You will hear a slight whir as the tape is unwound and respooled to a reel inside the drive. When the reel is loaded, the door is locked.

The software consists of five programs: TFormat, TImage, TSelect, Mount, and



### FACT FILE

#### M10

Micro Design International Inc.  
6566 University Blvd.

Winter Park, FL 32792

(305) 677-8333

List Price: \$525

Requires: 128K RAM, PC-DOS 2.0

CIRCLE 009 ON READER SERVICE CARD

**MICRO** Design International's handsome, lightweight M10 might be welcome on your desk for its design features alone. It offers only image backup onto microreels, rather than the standard cassettes or cartridges, and can be mounted as drive D: in your system—a useful feature in case your hard disk dies and must be sent out for repairs.



Unmount. The installation procedure, which is accessed through a batch-file program, consists of copying the files with a Verify option and changing the CONFIG.SYS file so that the device is set to the tape system driver. Formatting the tape takes a little over 20 minutes, at the end of which time the system beeps. You are then requested to enter tape and volume names and are given an opportunity to verify the tape, which costs you an additional 8 minutes. During the formatting and verification processes, tick marks showing the percentage completed appear on-screen.

If you are a firm believer in the file-by-file school, the M10 will score poorly—it supports only disk image backup. However, you can select and restore individual files from the image. It copies your disk's image onto tape; then the program displays the percentage completed in installments of 5 percent. When restoring the image, the software remaps the directory and lays down the files according to the new map.

When performing a restore with TSelect, the program automatically reads, then displays, the root directory. If the files you wish to select are in another directory, you must locate that subdirectory in the listing and place the cursor over the subdirectory name. In addition to the cursor keys, you can use the PgUp and PgDn keys. At that point you can select the appropriate files in the new subdirectory and wait until the new listing reappears. You accomplish file selection individually or all in one shot. If your subdirectories are as large as mine, this constant reading and writing of directories will give you enough time to get and drink a cup of coffee.

There are two other drawbacks to the TSelect program. Because the software does not ask for a destination, you must be logged onto the target directory. Also, the program itself must reside on the C: drive. Therefore, if your hard disk crashes and must be reformatted, you need to reinstall the M10 software first.

The Mount program allows you to use the subsystem as a floppy disk. Once mounted, you can use any of the DOS commands to access it and manipulate files from it. Note, though, that the program does not let you access files created with a disk image backup. The command Mount W creates a number of write buffers and

increases the speed by about 70 percent; however, if power is interrupted or the machine shuts down, all data not written to tape is lost. A tape mounted with the W option must be unmounted.

Despite all its good features, the M10 does have some distressing design problems. While the idea of using reels for storage brings up visions of mainframe power, the experience is more mundane. For one thing, the reels are extremely fragile; they tend to unwind easily, get lost beneath pa-

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■ If you are a firm believer in the file-by-file school, the M10 will score poorly—it supports only disk image backup.

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pers, and roll onto the floor. Respooling the reel is not only difficult but virtually impossible. And, if the exposed tape comes in contact with some dirt (which is highly likely if it falls to the floor), it will cause the CRC error correction technique to find errors. If the tape fails during the formatting process, it is noted and the tape cannot be used. Another problem is that the reels can get caught inside the drive and refuse to unload.

According to a spokesperson at Micro Design, the Intel 8272A chip on the floppy controller has a 30 percent fallout rate. IBM doesn't test the floppy controllers for tape-drive usage. If your M10 won't operate because of the controller card, Micro Design offers a trade-in for the card.

The manual I received consisted of photocopied pages stapled together. Most of its 30-odd pages were devoted to installing the hardware and software and to the error code messages. Virtually no screen shots or concrete examples were provided.

I might want to have the Micro Design M10 sitting on my desk for aesthetic reasons, but I wouldn't be able to trust myself with those micoreels—I'd be tempted to toss them out the window during the next ticker-tape parade. —Vincent Puglia

## LINTEC'S LI-60685

Lintec's LI-60685 is a no-nonsense, 60-megabyte tape backup subsystem that is made by the Archive Corp. and that Lintec sells as an OEM. It comes with its own customized version of Software Extraordinaire's popular *Fastback* software. Priced at \$895, it is one of the more competitive units reviewed. Except for one flaw in the cabinet's design—it has no tape guides or door—the Lintec unit could be an excellent choice for many users.

Installing the Lintec subsystem is simply a matter of plugging in the controller card and connecting the cable. The unit uses DC 600 tape cartridges for storage. The aforementioned design flaw manifests itself as soon as you attempt to insert the cartridge. Since the cabinet has only an empty slot, the tape tends to have too much play and occasionally slips into the track at an awkward angle. You have to keep fiddling with it until it slides in correctly. Nor does the unit come with a button to eject a tape, so that you have to resort to brute force to pull it out.

The *Fastback* software consists of four files, including on-line help. One of them, the installation program, is used for setting the controller configuration parameters. If you have a standard XT, the defaults will be fine, so you do not need to run the installation program. While the main program can be in its own subdirectory, the configuration and help files must be in the current directory. The only other executable file is the *Fastback* backup and restore program.

The *Fastback* menu is bare and to the point. It consists of a window for listing the available menu choices and another window that acts as a combined message/command line. The menu choices include operations for image and file-by-file backup, restoration, and verification; utilities for retensioning, erasing, and rewinding the tape; and the ability to list the tape's directory, search for a segment, and obtain a tape status report.

Image backup on the Lintec unit is simply a matter of indicating your choice from the menu, entering the drive to be backed up, and confirming your decision twice.



## ■ TAPE BACKUP

**LINTEC'S** LJ-60685, at \$895 for a 60-megabyte system, offers one of the most reasonable cost/backed-up megabyte ratios on the market. Lintec supplies Software Extraordinaire's Fastback software with the unit, which offers both image and file-by-file backup and restoration, as well as a number of useful tape utilities.



At an even 0.30 minutes per megabyte of data, the image backup was one of the fastest timed. Along with a message to tell you that the backup has been successfully completed, *Fastback* informs you of the number of soft errors and underruns. Soft errors are the corrections the software made as a result of the read-after-write error correction technique. As long as the number of soft errors remains less than 20, the tape remains usable. Underruns are the times the tape had to wait for data to be transferred.

Opting for a file-by-file backup brings up a command line. The syntax is essentially like that of DOS. You specify the drive, the subdirectory, the filename, and any options. *Fastback* offers a number of options including before or after a given date, on the current date, with or without archive changes, reverse date, since or until a specified date, all but a specified date, hidden file backup, and subdirectory backup. *Fastback's* file-by-file backup reads a block of disk data at a time and then writes it to tape. When backing up the entire disk, the program automatically creates separate

<b>PC</b> MAGAZINE	<b>FACT FILE</b>
<b>LJ-60685</b> Lintec Inc. P.O. Box 2381 Saratoga, CA 95070 (408) 370-7400 <b>List Price:</b> \$895; additional card, \$285 <b>Requires:</b> 256K RAM, DOS 2.0 <small>CIRCLE 625 ON READER SERVICE CARD</small>	

levels within a DOS segment for each subdirectory.

Like the backup operation, the restore function uses a command line. When restoring files, you have a number of choices. You can restore an image, restore file by file, or restore selected files from the image. Whichever you choose, you must advance the tape to the segment that contains the backup. Otherwise, the first segment available with the selected files will be restored. Restoring the subdirectory (TEST involved confirming the operation, advancing the tape to the proper seg-

ment, selecting the files with a wildcard designation, and hitting the Return key. The files are displayed on-screen as they are restored.

The *Fastback* software allows you to call an entire or partial directory listing. The system operates fairly slowly and extremely noisily while undertaking this process. While there are a number of options for listing the directory in various formats, the system has no built-in pause feature. You need to use the Ctrl-S or Ctrl-Num-Lock key combinations in order to stop the screens from rolling by. If you wish to exit the module, hitting Ctrl-Break will work.

The default directory listing is in the wide format with five files across, no date and time, no size, and no attributes. The partial directory supplies the root directory listing in the wide mode. After that, it offers the available modes (wide or standard) and directory options (next directory or the current one again). Once the mode is chosen, it becomes the default for as long as the program is being executed. The choices are picked up immediately; there is no need to hit the Return key. The standard directory listing includes the file's attributes (archive, hidden, system, and read only). The date is given with a four-digit year. The listing begins with the description of the backup session, the path, and its level.

The search segment function offers four options. You can designate the pathname, the date, /E for the end of tape, or /Q for all segments sequentially. You can use only the first two options with file-by-file segments. The last option is the only method that you can use for finding image backups. Once the program finds the segment requested, it pauses and asks whether you wish to continue to next segment or escape to menu. When appending backups, you should use the /E option.

While not typeset, the Lintec manual is one of the most comprehensive I've seen. Over 20 pages are devoted to the technical details of the tape drive and the controller card. There's no index, but the table of contents is so detailed, you can get by.

Except for the lack of a door or guides for tape insertion, the Lintec LJ-60685 is a respectable and competitive tape subsystem worthy of your consideration.

—Vincent Puglia

## GENOA GALAXY EXTERNAL TAPE BACKUP SUBSYSTEM, 3200 SERIES (3260)

The Genoa Galaxy External Tape Backup Subsystem, 3200 Series (3260), has an enormous appetite for files. Each DC600A standard tape cartridge can back up 60 megabytes of data, either file by file or as an image backup, including any or all files in a non-DOS partition of your fixed disk. Image backup can be restored to any hard disk of equal partition size to the original drive, and file-by-file backup can be restored to any fixed or floppy disk or RAM-disk.

The \$24-per-backed-up-megabyte price of the Galaxy 3260 system will be difficult to beat. For your money, you get a PC-style subsystem; the connector and power cables; a half-size card compatible with the PC, XT, and AT; two software disks; and a manual that will not draw raves from anyone. The card is available separately for \$329, so you could install one in each of six 10-megabyte hard disk machines and use the single Galaxy 3260 to back them all up once a week using a single cartridge. The economical user will relish the fact that you can perform multiple backups in multiple segments of the tape, each its own logical volume, and that a backup session can span more than a single tape.

As veterans of tape backup systems tell the tale, "It's all in the software," and this is where the Genoa system really struts its stuff. The screen display and menu system are among the finest I've seen, both with regard to functionality and user friendliness. For example, installation of the software is automatic, requiring just four key-strokes, but you can perform the process yourself if you wish to manually control installation parameters, such as selecting the DMA channel.

The Galaxy 3260 software will be appreciated equally by a power user and a first-time user because of its dual modes of operation: menu and batch. The menu-driven mode requires almost no knowledge of the program or the tape system, and its options can easily be run by most users without double-checking the manual. In the event that you don't understand

one of the program's prompts, you can call up a window of good on-line help, with each section including just the kind of examples you want to see. And if you make a mistake by inputting the wrong parameter, there is always a function key to back up to the previous prompt and another to abort the operation.

The menu window presents you with all the choices for the current prompt, and the status window displays the commands and parameters you have chosen in a list. The program moves the highlight bar through the list during execution, so you are never left in the dark, wondering what the system is doing. Another convenient feature of the display: The top of the screen lists the number of files selected for the current backup operation, as well as counting off the successfully backed-up files. And during image backup, the system displays a timer/percentage-remaining bar so that you

can accurately time a coffee break.

There are two command menus. The main menu lists the major backup and restore procedures; the secondary functions of retensioning, erasing, and certifying the tape, performing diagnostics on the tape drive, modifying the setup parameters, and installing the software.

From the menu, you can display a directory of files from any tape segment (as well as a directory of the segments themselves), including subdirectory files, and



### FACT FILE

#### Genoa Galaxy External Tape Backup Subsystem, 3200 Series (3260)

Genoa Systems Corp.

73 E. Trimble Rd.

San Jose, CA 95131

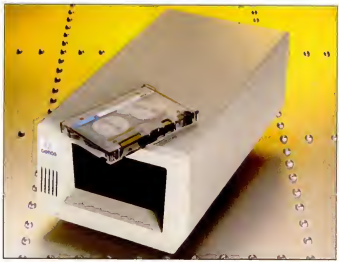
(408) 945-9720

List Price: \$1,400

Requires: 256K RAM, DOS 2.0 or later or PCnet or 3Com.

CIRCLE 88 ON READER SERVICE CARD

**GENOA** Systems Corp.'s Galaxy 3260 system is an inexpensive tape backup entry that features some of the best software on the market. Offering both menu and batch modes of operation, the software provides the user with both a high degree of friendliness and a high degree of control. It also offers a comprehensive on-line help feature.



## ■ TAPE BACKUP

specify a date range for the ones you want to see. The directory can be displayed like a DOS file list, in wide format, or as a tree structure. Very handy.

The Galaxy 3260 can also be run in batch mode—actually, there are two batch modes, automatic and manual. Using the automatic batch mode, you can preset which days of the week you will back up, at which times during the day, and which files will be included. So you can set an automatic backup of only modified files from Monday through Thursday and set an image backup for Friday. If you are using the computer at the time set for an automatic backup, you won't miss its audio message to stop what you're doing. Of course, you can override the system and abort or postpone the backup.

Manual batch mode is identical except you have to specify all the parameters each time you back up. The options include labeling the tape segment; retensioning tape before the backup; halting tape at the end of the backup; backing up files that have been changed within a date range, including subdirectories and excluding particular files; verifying the backed-up files; and printing a hard copy of the operation. Restore options are similar.

As for the Galaxy 3260's reliability and durability, I sensed no problems in the lab tests. Data transfer to and from the tape is fast and, as far as our tests showed, accurate. Genoa's engineers bragged about the durable construction of the unit. So, once they left the office, I decided to prove it to myself. During a restore operation, I lifted the front of the tape drive unit about an inch and let it drop to the workbench. The tape kept spinning despite the sudden shock. Then I tried about 2 inches and still no problem. On my third try from about 3 inches off the workbench, I succeeded in stopping the drive motor and the restore operation. The message on-screen said "Tape Read Error. (A)abort or (R)etry." I pressed R, the tape drive restarted its motor, and the restore procedure continued successfully.

What more can I say? The Genoa Galaxy 3260 works superbly, even when you kick it in the teeth. I would buy this unit if I had one or more large fixed disks to back up frequently, and I would brag about its operation. —Phil Wiswell

## GENOA GALAXY EXTERNAL TAPE BACKUP SUBSYSTEM, 3200 SERIES (3220T)

Some tape subsystems back up and restore disk images quickly; others have file-by-file operations with a lot of flexibility. The 3220T, included in the Genoa Galaxy External Tape Backup Subsystem, 3200 series, offers both. You can also restore selected files to any directory from a disk image. All of this comes with a menu-driven program that offers easy access to all the features, a DOS toggle, and on-line help.

Installing the Galaxy 3220T consists of plugging in the card, connecting the cable, slipping in a data cassette, and running the software installation program (note: While the controller card is smaller than a full-length card, it does not fit into the leftmost slot). The installation program copies the appropriate files into a subdirectory on the hard disk but neglects to include a path to it.

The menu-driven software can be used with any of Genoa's 3200 series tape units. Its main menu accesses the backup and restore features and the tape directory. The

secondary menu provides access to the "logfile," the installation procedure, and a number of tape utilities, such as retensioning, certifying, and erasing the tape.

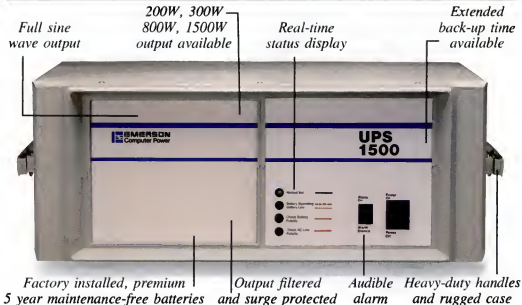
The Galaxy 3220T permits file-by-file and DOS-partition image backup and restore. Each operation is assigned a segment number on the tape that enables you to dictate which backup segment will be used on any given restore. However, while you can obtain a directory of any segment, each must be requested separately. In the actual backup or restore process, you identify the source, the files, the target, and any options. For example, when testing the restore feature, I identified the source as segment 2, the files as C:\TEST\\*.\*, the target as the original path (the default), and the option as /V for verify.

When performing a disk-image backup, the program displays the percentage completed; when backing up individual files, it displays the number of files to be

**SOFTWARE** makes the machine. Nowhere is this more true than in the case of the Genoa Galaxy series units, whose menus are visually pleasing and self-explanatory.



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**EMERSON**  
Computer Power

## ■ TAPE BACKUP



### THE

#### Galaxy 3220T

features both under-3-minute hard disk image backup and restore and flexible file-by-file operations. The menu-driven software also offers a toggle into DOS, online help, and the ability to restore selected files from a disk image into any directory. Tapes can hold up to 20 megabytes of data and require no preformatting.

operated on and the number completed. Backing up an 8.7-megabyte test file of data took 0.33 minutes per megabyte. Restoring the disk image was accomplished quickly.

Backup and restore operations include such options as the ability to exclude selected files, include subdirectory files, back up modified files only, print a hard copy of the transaction, verify files, overwrite files on the hard disk when restoring, and halting the tape at the end of operation. This latter option lets you access the segments for later processing much faster. The system software also allows you to set your own default options so that anyone can perform an operation simply by hitting the Return key a few times.

Once an operation is selected from the main menu, the program divides the screen into three windows. The rightmost one displays the status of the operation, displaying the command and any options being executed, the source and destination, and the various stages of the operation. The bottom of the left window is reserved for the actual names of files being

PC MAGAZINE	FACT FILE	
	Genoa Galaxy External Tape Backup Subsystem, 3200 Series (3220T)	
	Genoa Systems Corp. 73 E. Trimble Rd. San Jose, CA 95131 (408) 945-9720	
	List Price: \$1,095; additional card, \$179 Requires: 256K RAM, DOS 2.0 or later.	
	CIRCLE 686 ON READER SERVICE CARD	

processed. The upper portion displays the segment, the date and time when backed up, the label, the number of files backed up or restored, and the total number of fields to be operated on.

Because the Galaxy 3220T uses the QIC-24 format, no preformatting is required. Files are automatically backed up a block at a time, and each new operation is simply appended to the last. The use of a read-after-write correction scheme is standard; if the system encounters a read error, it repeats the process 16 times. If the error

persists, that section of tape is labeled bad.

Another of the software's features is the logfile. Each time you perform an operation, the program writes it to a file on the hard disk. In this way, you can view a log of the day's tape operations. The first screen level shows the type of operation, date, time, and label. The second level displays the names of files backed up or restored, the tape segment working path, and any options used.

The Galaxy 3220T also comes with a number of tape utilities. The diagnostics test for status control, start/stop, and streaming functionality. Tape erasure takes approximately 2 minutes; certifying the tape, which involves writing and reading some 41,400 records, takes another 5 minutes. Tape retensioning, which is not necessary with the TEAC cassettes, takes another 2 minutes.

The manual, while fairly complete, is difficult to follow because of its poor reproduction. The screen illustrations are especially difficult to read; actual screen shots would have been far more effective. Examples of menu operations are offered, but none are provided for the use of batch commands. On the positive side, the manual states which DMA channel (2) and interrupt (2) the subsystem uses.

The best is yet to come, though. Genoa also supplied PC Magazine with a prerelease version of its next update. It includes enhancements that truly bring tape backup one step closer to perfection. Some of the enhancements are simply frills, such as the ability to change the date and time within the program and a one-key installation option that appears when the program is booted from a floppy. Others are extremely functional enhancements, such as the ability to continue a backup onto multiple tapes if the end of media is detected and to program an automatic backup schedule. In addition to the DOS-partition image backup, the new version will back up non-DOS partitions, such as those used for XENIX or CP/M. You will also be able to sort directories by name, date, and size, allowing for greater flexibility.

The Galaxy 3220T is definitely a system for both novices and advanced users. It offers the flexibility and ease most people are looking for at a reasonable price.

—Vincent Puglia

## TECMAR QIC-60H

If you like to be kept informed of what your tape backup unit is doing, you'll love the Tecmar QIC-60H. This system has a large display on the front of the tape unit that tells you which track of the tape it is working on and which functions (read, write, or rewind) are being performed at any instant. This impressive flashing display of lights and numbers makes you feel like you got something for your money, which is reassuring, because at \$2,144, this was the most expensive system we reviewed.

The Tecmar hardware is visually appealing and well designed. The system uses the standard DC 600A cartridges, which can hold 60 megabytes of data. The cartridges insert easily and lock in place automatically. The tape unit contains a fan that can be heard over the PC's own fan, but forced cooling should theoretically increase the life of the system's electronics.

The Tecmar cabinet is a perfect match for the PC, and it sits compactly at its side. The QIC-60H is less than 4 inches wide and 7 inches high. The same cabinet is used for a version of the QIC-60H that combines an integral hard disk with the tape backup mechanism. However, the tape unit cannot be upgraded with a hard disk because of different arrangements of the tape electronics in the two units. The cable that connects the QIC-60H and the PC uses high-quality shielded cable connectors. You can buy extra circuit cards so that you can move the tape machine between different PCs, but the stiff shielded cable and firmly mating connectors don't encourage frequent disconnection and reconnection.

Tecmar's tape systems can give you both mirror-image and file-by-file backups and has a full set of features that operate flawlessly. Installing the QIC-60H consists of inserting one circuit board into an expansion slot of the PC, connecting the cables, putting the Tecmar disk in the A: drive, and typing INSTALL. In about 3 minutes, Tecmar's program builds a new subdirectory on your hard disk, containing the software you need to perform disk backups and restores.



### GOOD

*design and visual appeal mark the Tecmar QIC-60H tape backup system. Capable of backing up to 60 megabytes of data onto one cartridge, this unit features an external display that tells you which track of the tape it is working on and which tape function it is performing. The software's exceptional on-line help includes a unique glossary of tape and disk terminology.*



## FACT FILE

### Tecmar QIC-60H

Tecmar Inc.  
6225 Cochran Rd.  
Solon, OH 44139-3377  
(216) 349-1009  
List Price: \$2,144  
Requires: 192K RAM.

CIRCLE 804 ON READER SERVICE CARD

Tecmar's software is remarkable for its on-line help. The help screens even include an on-line glossary of terms specific to tape and disk systems—the first I've seen. This help is particularly useful if backing up files isn't something you do every week or if different people in the office sometimes back up files.

The tape control program makes good use of the PC's screen and special function keys. If your PC is equipped for color, the program will give you a pleasant blue-and-gold screen display with uncluttered menus that clearly describe the choice be-

tween a mirror-image backup and a file-by-file save. It lets you save only a file, a subdirectory, or the entire disk. Similarly, you can restore data the same way if it was saved in the file-by-file mode.

If you would like to further automate the backup process, Tecmar's manual describes commands for use in other programs or in batch files to make use of the tape system. The only way this system can be programmed to perform backups at a specific time of day or day of the week is to include these commands in a program written in BASIC or some other language. The extra programming code would have to do the work of checking the time, date, or other conditions before initiating a tape action with the Tecmar commands.

The QIC-60H took 0.79 minutes per megabyte to make an exact mirror-image copy of all of the data on the disk. Much of this time was used by the machine to position the tape, so if the mirror image is made after some other tape functions have been performed (such as backing up a subdirectory), the system could have made the image backup in about half the time.

# If you *don't* have data worth preserving, then the reasons for buying Cartrex's new 1/4-inch, high performance, virtually error-free tape cartridge won't mean anything

But, if you are one of the many 1/4-inch tape cartridge users that assume 3M's cartridges just *have* to be "good enough" for today's high performance tape drives, read these simple facts to understand why that isn't true anymore.

PILOTS HAVE A SAYING, "There are those who have made a wheels-up landing—and those who will."

You can apply this expression to those who have lost data and those who will. Unfortunately, data loss isn't always because users haven't backed-up their hard disk. Sometimes it's their 1/4-inch tape cartridge, where they back up their hard disk, developed hard errors—those insidious errors that tend to increase over time. That's why Cartrex has developed a 1/4-inch data cartridge for today's high performance drives that virtually eliminates errors.

## Why a new cartridge

When 3M announced its cartridge in 1971, it was designed for a low capacity tape drive with less than 3 megabytes—2.88 to be exact. The tape was low in density—1600 bits per inch with only 4 tracks and 300 feet of tape.

The tolerances required for the tape drives of the early 1970's were fine for then, but today's tape drives require much tighter tolerance. Today's tape cartridges must work with drives that have 9 or more tracks and bit densities as high as 12,000 bits per inch on 600 feet of tape. That means capacity increases of 2,000 percent packed into the same cartridge.

The reasons that yesterday's cartridge technology simply won't work properly in today's high capacity drives is inherent in the cartridge design.



The new Cartrex 1/4-inch tape cartridge is the first new tape cartridge design in almost a decade and a half. Tape drive manufacturers now have a new cartridge technology which allows them to advance beyond this previous artificial barrier.

With the significant increases in capacity, the three culprits that make cartridge tolerances so important are fluctuating tape tension, redeposit nodules, and instantaneous speed variations (or ISV).

## Tape Tension

Any child who has played with a magnet understands that as the magnet is separated from metal, the magnet's ability to work is decreased. So

it's no surprise to find out that the closer the tape drive head is to the tape, the better the reading. This closeness is particularly important when the embedded iron filings get packed tighter in today's high density tape.

It's also important with the increase in the number of tracks. After all, you wouldn't want the head to be reading an adjacent track any more than you'd want it reading more than one magnetic representation of a bit.

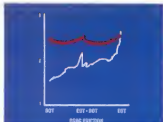
Unfortunately, tape tension historically has not been constant. As the tape unwound, the tension increased. What's important is both the *amount* and *range* of tension. A fluctuating increase or decrease in tension is as unacceptable as low tension is in the first place. As the accompanying graphs



The Cartrex cartridge design (upper left) uses the N2 principle which creates head-to-tape tension by applying a mechanical differential at the rear pulley between a stiff transport belt and a stiff tensioning belt, indicated in green and yellow in the color schematic (upper right).

The conventional 3M design applies drag at the rear pulley to create tension, which creates heat, and limits future speeds much above 90 inches per second.





Good head-to-tape tension ensures the highest probability of reliably capturing data. Fluctuating tape tension allows data loss due to head-to-tape separation and smearing redeposit nodules across the tape head. The Cartrex cartridge, compared to the conventional design, creates constant and higher tension.

show, the Cartrex cartridge has higher tension and flatter profile than the 3M cartridge. This means more reliable data across the entire tape.

### Redeposit Nodules

Another reason to keep constant tension is to avoid "redeposit nodules" from smearing across your tape drive's head. What are redeposit nodules? They are the insidious flakes of tape media that break off from the edges of the tape and get dragged up to the edge of the tape head. If the tension is low, or becomes low when the tape starts or reverses, the flakes come up over the edge, get smeared over the head, and reduce its ability to read the data.

Even worse, however, is that these redeposit nodules are dragged along the surface of the tape and get embedded and packed over time. When your drive tries to read the data, the redeposit nodules act as a tent pole holding up the tape away from the head. As a result, even the best error-recognition algorithm can only tell you one thing—you've lost the data.

You might be wondering what causes the flaking in the first place. Again, it is cartridge design. The basic design uses a tape guide, shown in the accompanying illustration. The problem with this approach, is that it presupposes that the tape will always run parallel to the top and bottom caps of the tape guides. At the low speeds of

30 inches per second typical of when the 3M cartridge was designed, it was less of a problem. But at today's speeds of 90 inches per second and more, the tape wanders. When it presses against the top of the tape guide, the tape's edge pressure builds. Not only does media flake off, but you lose data due to the "coining" or "scallop" effect.

Cartrex eliminated the cause of the tape coining or scalloping by developing a barrel-shaped roller placed prior to the tape guide. The laws of physics show that by riding on a rounded barrel, the tape will always seek the middle, reducing the tape edge pressure. This seemingly simple addition causes the tape to always enter the tape guide with zero edge pressure. In this way, the possibility of media flaking off and creating redeposit nodules is virtually eliminated.

### Instantaneous Speed Variation (ISV)

Instantaneous speed variations is exactly what it sounds like—small, instantaneous changes in tape speed as it crosses the tape head. At slow tape



You can compare the Cartrex design on top with the conventional 3M design (lower left) and DEI, a 3M licensee (lower right). The omission of "edge tension reduction guides" (indicated in dark blue on the color schematic) on either the 3M or DEI design means that tape edge pressures will increase causing the magnetic media to flake off, smear across the tape head, and cause "redeposit nodules" to become embedded in the tape.

speeds and low bit densities—like the 1971 standard of 30 inches per second and 1,600 bits per inch—ISV wasn't as big a problem. At that time, the bits were crossing the head at 48,000 bits per second.

Today, however, the story has changed. 90 inches per second and 8,000 bits per inch mean that 720,000

bits cross the head every second. A 1,500% increase.

As you may have guessed, speed fluctuations in the 48,000 bits per second made reading data difficult for tape drive electronics. But when the electronics have to guess whether or not the bit rate of 720,000 bits per second is accurate, the electronics can become overwhelmed.



High speed tape without the "edge pressure reduction guide" seldom enters tape guides parallel to the top and bottom. The edge pressure which results creates "scallop" or "coining" on the tape. The effect is data loss due to head-to-tape separation, flaking media that smears across the head, and "redeposit nodules" that create hard errors.

### Never a Single Issue

Your tape drive seldom has the luxury of dealing with an isolated problem. It's usually a combination of ISV, redeposit nodules, and tension problems all together. Now you understand why Cartrex wanted to develop a cartridge for a market that needed a modern alternative.

### Where to get it

Not only has Cartrex improved on the industry's 15 year old technology, they have done it for a competitive price.

Now you can have peace of mind when you back up your hard disk on today's sophisticated tape drives.

And you can have it fast. Simply phone:

**(619) 485-6603 EXT 100**  
and give Cartrex your credit card number and they will send your cartridges by return mail.



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**CARTREX**

CIRCLE 525 ON READER SERVICE CARD

## ■ TAPE BACKUP

The Tecmar mirror-image program must restore data to a disk with the same size and format configuration as the disk it took the data from. It can, however, reallocate data around bad sectors on the disk so the restored drive does not have to be the same one from which the mirror image was made. This feature is important because some mirror-image programs are the only insurance against someone's typing **FORMAT C:** by mistake; the data must go back to the disk from which it came. But the Tecmar QIC-60H system is useful for quickly moving up to 60 megabytes of data between physically different hard disk drives. One important caution: Make sure the versions of DOS are exactly the same if you carry data between machines. Trying to transfer between machines with different versions of DOS with a tape system can result in a total loss of information.

The tape utilities selection on the Tecmar menu allows you to select between re-tenioning the tape, reading the directories or filenames on it, or erasing it. The program asks you to double-check commands that could lead to the loss of data such as Erase. You can use the tape utility program to search for a particular file or subdirectory on the tape by name, so you don't have to read an entire directory to see if the file you want is in the tape.

Generally, the data-transfer program seems efficient. The data is buffered so that the light on the hard disk doesn't go off and information is sent to the tape in large blocks that keep the starting, stopping, and tape movement to a minimum. The display on the front of the tape unit tells you what the drive mechanism is doing, and messages on the screen give you a blow-by-blow description of what the program is doing. Filenames scroll by as they are copied, so you have a good feeling that the backup is successful and that it actually includes the files you meant to specify.

Certainly, less expensive tape backup systems are on the market. But the Tecmar system just doesn't have any glitches. The software will do anything you need from making fast mirror images to restoring a single file. Only a clock/calendar interface is missing, and that can be supplied by an outside program. The hardware is well designed and good-looking. You get what you pay for. —Frank J. Derfler, Jr.

## MAYNARD'S MAYNSTREAM 20

The MaynStream 20 is a 20-megabyte portable tape backup system whose basic design and principal advantage hinge on the borrowed motto: "Have data, will travel." The handsome cassette unit—not much larger or heavier than a library card-file drawer—is equipped with a carrying handle to facilitate shuttling the MaynStream between multiple computers. If you have 20 different hard disks, you can back them up with one MaynStream and a supply of tapes. It's an extremely versatile machine.

The system is composed of the cassette unit, an ultrashort card that fits any slot, a cable connector, one disk, one cassette tape, and a masterfully produced manual that actually has photographs of the components. Hardware installation is simple and well documented, requiring no more than 5 minutes. All you do is open your system unit, snap the 3-inch-long board into any open slot, plug in the connector

and the power cables, and power up.

Software installation is equally straightforward, and most users should be backing up their first files within 10 minutes of opening the carton. After making a backup copy of the program disk, you simply type **INSTALL**. Two minutes later, you can begin using the MaynStream in any of its three operating modes, all three of which



### FACT FILE

**The MaynStream 20**  
Maynard Electronics  
430 E. Semoran Blvd.  
Casselberry, FL 32707  
(305) 331-6402

List Price: \$1,595

Requires: 128K RAM (256K recommended), DOS 2.0 or later.

CIRCLE 708 ON READER SERVICE CARD



### HAVE

*data, will travel—that's the motto of the Maynard MaynStream 20 system. The cardfile-sized unit is packaged for portability and includes an ultrashort interface card, a single disk of software, and a handy carrying handle so you can shuttle the unit between a veritable fleet of hard disks.*

## ■ TAPE BACKUP

are useful to many working environments.

The first operating mode is called the "automatic backup system," activated by typing the command **SAVE**. The screen clears, and the single question "Do you wish to back up your entire disk drive?" appears along with the "No" and "Yes" choices. Backing up your hard disk drive requires no more than highlighting the "Yes" option and pressing Enter. In the lab, the MaynStream 20 backed up our 8.9-megabyte test file in a fast 2.11 minutes per megabyte. The system does not offer a fast image backup, but I will be hard pressed to think of another criticism.

The second operating mode is called the "menu system," activated by typing **TMENU**, which offers seven options: Backup, Restore, Verify, Dir, Tension, Erase, and Quit. As you highlight a command with the cursor, an explanation of its function appears on the line beneath; few users will feel the need to refer to the manual. Pressing Enter selects an option.

The Backup option will back up an entire disk drive, floppy or fixed; the menu displays your drive letters for you to select by highlighting. And look Ma, no formatting! You just insert the tape and start backing up without the usual 40-minute delay to format it. The Restore option is the reverse of Backup. It prompts you for the drive to which you want the entire contents of a tape copied. The MaynStream allows you to back up and restore non-DOS partitions on your hard disk, but only when it detects the partition does it ask whether or not you want to back up or restore it.

The Tension option is an automatic procedure that retensions the tape to protect reliability; Maynard recommends using the option after every 20 backups on the same tape. The MaynStream allows you to overwrite existing data on the tape, but if you want to make sure certain information disappears from the tape, you can use the Erase option. The last command on the menu other than Quit is Verify, which verifies that all data from a particular drive has been backed up reliably on the tape.

The final mode of operation, called the "advanced command structure," offers all the functions of the other two modes under much more flexible control. For example, you might back up your I-2-3 worksheets with the command **TBACKUP**

Complete with tape drive, controller, and software

# Announcing a complete internal half-high 60 megabyte tape backup system for your IBM PC, XT, or AT that backs up your hard disk automatically for only \$995

**E**xpress Systems' AutoBak™ software will back-up your hard disk by image or file-by-file. And it will let you tell it to back-up automatically by date, time, extension, subdirectories, or everything since you last backed up.



For an additional \$250 you can own either the Express Systems half-high or full-height subsystems. Each subsystem comes with its own power supply and room for a hard disk—also available from Express Systems.

## Tape Systems and Subsystems

Formatted Storage Capacity	Height	Data Transfer Rate (K/sec)	PC or PC XT	AT
60 Mbytes	1/2	88	\$ 995	\$ 995
60 Mbytes Subsystem		88	\$ 1,245	\$ 1,245
26 Mbytes Floppy Tape® Subsystem		31	\$ 749	\$ 749

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Let's face it, when was the last time you rushed off before putting something away or cleaning up your desk? Well, a sloppy desk is one thing, but failing to back-up your hard disk can be quite another. That's why Express Systems created AutoBak™. This new software lets you forget about protecting one of your business's greatest assets—the information stored on your hard disk—and takes on the responsibility for you.

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And it doesn't poke along. It reads and writes at 90 inches per second (ips) and transfers data at up to 5 megabytes per minute in the streaming mode. You don't have to be a rocket scientist to

figure that you can perform an image backup of a 20 megabyte hard disk in about 4 minutes. But practically speaking, once you back up your hard disk completely for the first time, you never need to do more than invoke the archive command—that convenient command that tells your new tape drive to backup everything since you last backed up. If you backup as often as you should, your Express Systems tape drive will finish the job virtually in seconds.

## Easy to install

Before you get intimidated about installing our tape drive internally, you should understand that IBM doesn't think it's too hard. They're selling IBM PC ATs with instructions on how to add additional hard disks in the *Installation and Setup* manual that comes with the AT. Our instructions for installing your new Express Systems tape drive follow IBM's clear, simple instructions.

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Pick up the telephone and call 1-800-341-7549 Ext. 2200 to order. We accept Master Card, VISA, American Express and Diners Club.



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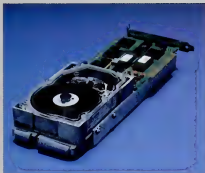
Express Systems, Inc. 1254 Remington, Schaumburg, IL 60195

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CIRCLE 383 ON READER SERVICE CARD

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Express Systems, Inc. 1254 Remington, Schaumburg, IL 60195

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## ■ TAPE BACKUP

**CA/LOTUS®.WKS/S/M/A/F.** This command translates in English to: Go into the LOTUS directory and back up all files with the extension .WKS, including .WKS files in all subdirectories of LOTUS (S), selecting only files that have been modified since the last backup (M). Append rather than overwrite on the tape (A), and list the files on the screen as they are backed up (F).

Other options allow you to back up all files after a certain date and to back up non-DOS partitions. Wildcards are allowed in both filenames and extensions.

The TRESTORE command has similar flexibility, including the option to be

■ I wish I had a  
MaynStream 20. It would  
facilitate house calls to a  
client's sick hard disk  
and give me fast, reliable  
backup in the interim.

prompted before restoring a file that has been changed since the last backup. The TDIR command gives you a directory of files from the type or of any subdirectory from the tape. You can use the Tension option with or without the Erase option. The TVERIFY command and its options compare sections of the tape with those on your hard disk.

I wish I had a MaynStream 20. It would certainly facilitate house calls to a client's sick hard disk and give me fast reliable backup in the interim. And just think how much data a friend could let you siphon from his hard disk in less than half an hour! Of course, each computer using the MaynStream must be equipped with the special controller card, but these are available separately for \$195 each, which means you could protect and maintain a fleet of 20 hard disk machines for a \$5,000 investment. That would make my accountant sleep at night. How about yours?

—Phil Wiswell

## ■ TAPE BACKUP

### SYSGEN QIC-FILE

The most distinctive aspect of the Sysgen QIC-File tape backup system is that it tries to be invisible. Designed to be as unobtrusive as possible, the QIC-File hardware is small and compact, measuring only 2 inches high, 6 inches wide, and 9 3/4 inches deep.

This small box can fit next to or on top of a PC. The long, shielded connecting cable also lets you tuck the tape drive away in the corner of a desk. Such compactness is achieved by putting the power supply in a separate box, which can be located behind the PC. A clever Sysgen designer found a way to keep QIC-File out of sight and mind by giving the power supply a plug that fits into the PC's monochrome monitor power socket. This connection automatically delivers power to the tape system whenever you turn on the PC's big red switch. The QIC-File plug also has a through connection so that you can still plug in the monochrome monitor; a separate pigtail lead is supplied in case you are using a non-IBM computer without the monitor power plug. The interface card inside the PC is a short board requiring one expansion slot.

The QIC-File tape drive has a red power light, but no other indicators. There is no fan, and the sound level of the tape during operation seems lower than that of similar units. Basically, the hardware just sits out of the way and works.

Sysgen's QIC-File uses a standard proven tape media: DC600A 60-megabyte cartridges. PC Magazine Labs tested two QIC-File units. One had a manual lever for locking the tape in place, and the other had an automatic tape latch. Our impression, based on this small sample, is that the automatic latching mechanism worked more smoothly and was less likely to be damaged by forceful handling than the manual one. But this difference is probably subject to the same kind of debate that rages between proponents of top-loading and front-loading VCRs. The bottom line is that they both work.

The software features an automatic utility that keeps track of the date and time and makes backups according to a detailed

**N**ow you can own up to 144 megabytes of hard disk storage—in one file if you like—for as little as \$3,795. That's only \$27 per megabyte.



**Complete 72 Mbyte Hard Disk Kits—(all transfer rates 5 Mbits/sec)**

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### Get around the DOS 32 megabyte limit

Until now, if you wanted to store more than the 32 megabyte limitation built into PC DOS, you were out of luck. That is, unless you wanted to try some unreliable device drivers or some outrageous price from a subsystem house.

#### How it works

Express Systems' unique Coalesce™ software not only lets you get around the 32 megabyte limitation—but it lets you add a new hard disk to your current hard disk and have them both act as one disk or volume—even if their combination exceeds 32 megabytes of storage. For example, if you own an XT and want to add more storage, all you have to do is add a half-high hard disk to your current full-height hard disk, and you can treat them both as a single hard disk.

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## ■ TAPE BACKUP

stored schedule. After the initial setup, you may never have to do anything more than insert and remove the tapes: Everything else is automatic.

To install the QIC-File software, simply type A:INSTALL. The installation program writes the needed files on the hard disk and even creates an AUTOEXEC.BAT file to call the automatic backup program. If you have an existing AUTOEXEC.BAT file in the root directory, the installation program will keep what you have and add several new lines of commands to the end.

The file backup program puts great emphasis on automating regular backups. This is done through the clock calendar, which can be set to do up to two backups a day every day of the week. Using the graphic calendar display, you can select the times and days for backups and specify which files or directories are to be copied. If you wish, you can have only the files that have been updated since the last backup copied; you can also selectively back up hidden files and subdirectories. Backups can be scheduled at a time when there is little chance of the system's being in use. Also, you can quickly make temporary or permanent changes to the backup schedule from the calendar display.

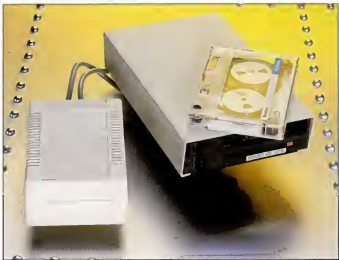
My only criticism of the automatic backup program is that it is very single-minded. The backup screen pops into view each time you boot up the system. It checks the tape in the unit, and if it doesn't find a tape with the proper identification, it will continue prompting until it does. If you are just using the machine casually and don't need the tape system, you have to use the Esc key to get rid of the program, but this isn't suggested on the screen. People who don't instinctively reach for the Esc key could be frustrated by the program's persistence. Some sort of "Don't bother me now" option would be nice.

A semiautomated program is available to help you restore files. The restoration program shows you a directory of the tape and asks you to select those files or subsets you want to restore. You can use normal DOS wildcards to reply, so \*. \* will restore all of the files in any directory, while \*.DAT will only start the program looking for the files with that extension.

Of course, all of this automatic-pilot

### SYSGEN

*Inc.'s Sysgen QIC-File performs its backup chores unobtrusively. Compact and quiet, the QIC-File's software is written with automation in mind, although you can take matters into your own hands for a maximum of control. High on this system's list of handy features is the ability to automatically back up selected files only as they are changed.*



### PC MAGAZINE FACT FILE

**Sysgen QIC-File**  
Sysgen Inc.  
47853 Warm Springs Blvd.  
Fremont, CA 94539  
(415) 490-6770  
List Price: \$1,495  
Requires: 192K RAM.

CIRCLE 681 ON READER SERVICE CARD

operation is great for ensuring that the job gets done, but there are times when you want to guide the system yourself. The QIC-File system includes several programs that can perform mirror-image or file-by-file operations under your close control. The image-backup and file-backup programs each have a prompted and command-driven mode. The prompted mode isn't fancy, but it presents simple questions that help to configure the program to your specifications. The command mode can be used to issue .BAT file instructions or to call the tape programs from another program. A number of func-

tions and parameters can be linked on one DOS command line so that the program knows what to do when it starts up. These file and tape management programs work efficiently, but tapes created in this mode cannot be used with the automated software. The automated programs apparently do not examine the tape closely enough to see the options you may have used in manual mode, and they might write over existing data.

QIC-File's automated mode of operation is the way the system is designed to be used. But both the automated and manual modes give you a full range of capabilities for file-by-file or mirror-image backups and restorations.

Backing up data is a chore that requires discipline, and probably nothing is so disciplined as an automated program. Sysgen's QIC-File is uniquely designed to automate the backup process while imposing an absolutely minimal burden on you. By selectively backing up significant files only when they are changed, it could be a long time before you have to replace the 60-megabyte tape.

—Frank J. Derfler, Jr.

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## ■ TAPE BACKUP

# CIPHER'S 5210 FLOPPYTAPE BACKUP SYSTEM

The advertising literature for Cipher's 5210 FloppyTape Backup System promises you a real bargain: \$1,095 buys you the capacity to back up a 10-megabyte hard disk drive onto its FloppyTape format in a rapid 10 minutes. PC Magazine Labs' tests, however, revealed another side to this story.

The 5210 looks like a PC, except that it is about one-third as wide. Getting the hardware going on an XT was a snap, since the drive connects by cable to the XT's floppy disk controller, a system that is also convenient for moving the unit around to different computers. Installing the 5210 on an AT is more difficult, requiring a separate controller card. To insert a tape into the drive, you pull out a tray, slip the tape onto the tray, and push it in. Hit the power switch at the rear of the unit, and off you go.

The 5210's software, which gives you the option of working either from a menu or with commands, is slightly less pleasant to deal with than the hardware. The menu structure is simple and functional, but visually primitive in that it uses no color and the menus are written to the screen slowly, one character at a time. A set of choices appears, each of which takes you to various submenus. The 5210 responds to four commands: FTFORMAT, FTDIR, FTBACKUP, and FTRESTORE. Each command can be used with a complex set of parameters and, when appropriate, path and filename specifications.

The Cipher drive does not conform to the QIC-24 tape standard, which requires no tape formatting, but it does format in about 40 minutes—one-third the time of drives that use the common PC/T tape format. Once formatted, a standard 1/4-inch FloppyTape cartridge can receive up to 25 megabytes of information. The software notifies you of any bad sectors that lurk on the tape.

When you are ready to back up your disk, you will find that the menu does not let you do everything that the commands allow. Choosing the Backup Files to Tape option from the main menu takes you to the backup menu, which allows you to

back up the entire disk, a subdirectory, or just those files that have been modified since your last backup. This last option is a real timesaver that should be a standard feature in any software written for backing up hard disks.

We expected the backup operation to take about 10 minutes, as per the manufacturer's claim, but our tests revealed an av-

erage time of 5.92 minutes per megabyte. The claimed time of 10 minutes to back up 10 megabytes is for an unverified backup. If you use the menu to back up your disk, you will always get a more desirable verified backup. If you want to perform the speedier, but less reliable, unverified backup, you have to enter the command

```
FTBACKUP C:\ /S/X/t
```

where CA refers to the root directory, s refers to subdirectories, x places the names of files on the screen as they are backed up, and t gives the time of the backup.

All of PC Magazine Labs tests were run with a CONFIG.SYS value of BUFFERS=20. By increasing this value to 75, we were able to speed up unverified backup times somewhat. However, the 5210 documentation suggests a value of 16 for the buffers. A spokesperson for Cipher thought the slow times might be caused by a defective unit, but a switch to a different unit produced no improvement in the times. The Cipher spokesperson then suggested that the problem might be due to a slow drive, a slow hard disk controller, or

**PC**  
MAGAZINE

**FACT FILE**

**5210 FloppyTape Backup System**  
Cipher Data Products Inc.  
10101 Old Grove Rd.  
San Diego, CA 92138  
(619) 578-9100  
**List Price: \$1,095**  
**Requires: 256K RAM, hard disk drive,**  
**DOS 2.0 or later.**

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**CIRCLE 666 ON READER SERVICE CARD**



## CIPHER

*Dato Products' 5210 FloppyTape Backup System offers 25 megabytes of backup capability in an easy-to-install system. The software lets you choose between file-by-file, image, and directory backup and can back up only those files that have been modified since your last backup. The unit can be easily transported for use among several hard disks.*

some combination of both. We checked the drive with the Core benchmark test and found the average access time to be 93 milliseconds. Cipher used high-performance 40-millisecond drives to achieve its times. This might account for the discrepancy in backup times, but 40-millisecond drives are not normally used in an IBM PC-XT. The hard disk controller that we used was also standard XT hardware. It may have slowed performance somewhat, but we were not able to prove this contention one way or the other.

The next PC Magazine Labs test was to append a directory backup to the original backup. When we selected the Directory Backup option, we were informed that the operation erases any data on the tape drive. We did it anyway. If we had used the FTBACKUP command (which is well documented in the user manual) rather than the menu, we could have appended to the end of the original backup.

A file restore from tape to disk works much like a backup. You select Restore from the main menu to bring up the four-choice restore menu. Besides restoring all files or a subdirectory, you can restore files by the date on which they were created, which Cipher calls a "date window" restore.

When the unit has finished backing up your disk, you are notified of any errors that may have occurred. If there are errors, they are designated as either correctable or noncorrectable. Correctable errors can be fully recovered automatically through the system's error-correction scheme, which reserves one 1K-byte data sector for error correction information out of every 17 written to tape. If there is more than one error in any given 17K-byte segment, the error is uncorrectable and data must be recovered by retrying the backup one or more times.

Documentation for the drive is thorough and clearly presented. There is some general information on tape backup, information on how to set up your system with AUTOEXEC.BAT and CONFIG.SYS files, an explanation of the menu system and tape commands, and appendices on error messages and maintenance.

The Cipher 5210 proved to be reliable but slow, which is especially interesting in light of the manufacturer's claims for the

unit. But for those who are more cost conscious than time conscious, the 5210 offers an effective backup for several hundred dollars less than most units. The fact that the tape holds only 25 megabytes is not a real problem since the FTBACKUP program can use more than one tape for a backup if needed. For XT users, the ease of installation is an added dollar-saving bonus, since it could allow the 5210 to be used for backing up several different machines. The drive can't be all things to all people, but it is certainly a viable choice in the tape drive market. —Joe Desposito

## SIGMA DESIGNS' SWS-0060

Sigma Designs' SWS-0060 backs up as much as 60 megabytes of data onto 1/4-inch DC600A cartridges, using the QIC interface. What's interesting about the Sigma drive, however, is its software, whose menu design has taken a page from Lotus's 1-2-3. This familiar user interface makes it a breeze to perform a variety of backup tasks with the Sigma drive.

The colorful menus are detailed and presented in a consistent and attractive manner. Screens are divided into several sections. The horizontal main menu is called the select menu. The parameter menu is in a vertical column below the select menu. A status box and a menu message area fill out information about the menu choices and show the available function keys. For instance, F1 is help, F10 is select, and so forth. Whenever you need to add parameters, a slash appears on the status line. The choices appear when the Slash key is pressed.

The drive is about one-third as wide as the XT. The case can take a hard disk, which Sigma sells. Hardware setup is easy; just slip the controller card into your XT's short slot, attach the shielded ribbon cable, slip a tape into the opening at the front of the drive, and boot up the software.

The opening screen offers you six menu choices: Backup, Restore, Directory, More, Tutorial, Exit. Choosing Backup changes the row of selections to Options, Files, DOS, Entire Disk, and Quit. At this point, you are ready to begin backing up your hard disk; all you need to do is decide which kind of backup you want.

The SWS-0060 performs both image and file-by-file backups. If you want an

**MENU** structure for the Sigma Designs SWS-0060 software consists of a series of tape commands and parameters preceded by slashes, much like Lotus's 1-2-3.

```
BCOPY: The Intel tape structured copy utility. Version 1.00
(C)Copyright Sigma Designs, Inc 1985

usage: BCOPY [/S /M /D /R /C [/I /V]] (source path) (destination path)

Where: /S      Copy subdirectories also.
        /M      Only copy modified files.
        /D      Only copy files with later dates.
        /R      Replace (don't remove all) files on destination.
        /C      Clean (remove) all files first.
        /I      Use Image transfer.
        /V      Verify after image transfer.
```

## ■ TAPE BACKUP

**SIGMA** Designs' SWS-0060's software features a menu structure that resembles Lotus' popular 1-2-3, making backup tasks a breeze. Using standard 60-megabyte DC600A cartridges, this unit installs easily and allows great flexibility in the kinds of backups it makes. The case has room for a hard disk, which Sigma also sells.



image backup, you choose between DOS and Entire Disk. The difference between the two is in the kinds of partitions you have on your hard disk. A DOS backup will make an image of a partition that was formatted under DOS. A backup of the entire disk will make an image of all the partitions on the disk, regardless of whether they were formatted under C/PM-86, XENIX, or whatever.

The more typical and useful test of a tape drive, however, is its ability to perform a file-by-file verified backup of the disk. On the SWS-0060, you do this by selecting a "verify" parameter from the options menu and then selecting Files. When you are prompted for the filename, you can select an individual file, a subdirectory, or all the files on the disk.

To back up all files on the disk, you enter C:\ as your filename and then set the program to search for subdirectories. This took PC Magazine Labs 2.96 minutes per megabyte; during this backup period the software keeps you informed of the backup status by indicating the current file and its size. The words *ready*, *executing*, and

<b>PC</b> MAGAZINE	<b>FACT FILE</b>
<b>SWS-0060</b> Sigma Designs Inc. 2023 O'Toole Ave. San Jose, CA 95131 (408) 943-9480 List Price: \$1,595 Requires: 256K RAM.	
CIRCLE 697 ON READER SERVICE CARD	

complete flash for each file.

After backing up all the files, PC Magazine Labs appended a file-by-file subdirectory backup to the original backup. This took nearly as long as a complete backup of all the files, even though the directory was only about one-half the size of the original backup.

To restore the subdirectory to the disk, you simply choose Restore from the main menu and follow the submenus, which are similar to those under Backup.

The Sigma drive also lets you back up only those files that have been modified

since the last time the disk was backed up. To do this, you bring up the criteria section of the backup menu. One of the selections on this menu is file attribute, which apparently instructs the program to check the archive bit. However, this part of the program has not yet been implemented, a recurring problem throughout the menu structure. The software is not 100 percent complete, and certain functions remain in the vaporware stage of implementation.

An interesting feature of the SWS-0060's software is the More option. This menu selection brings up four subchoices: Software Setup, Hardware Setup, Control Tape, and Diagnostics. Software Setup can input batch files, output log files, save menu parameters, and change the border color. Hardware Setup lets you select the tape direct memory access (DMA) channel, tape port I/O number, and DMA buffer size. Since DMA channel 1 is not likely to be already in use on an IBM PC or XT, that is the default setting. However, if you install a network that uses DMA channel 1, you can switch to DMA channel 2 by changing jumpers on the controller card. Changing the tape port I/O number involves sending the board back to the factory. In most cases, the default values are okay, but at least these options are available in case you need them. The Control Tape option lets you use the software to erase, rewind, or tension the tape. You can also run tape diagnostics by selecting the appropriate menu choice. If you prefer, you can override the menus and control the tape drive by entering a command called STAPE along with any appropriate parameters.

Sigma Designs' SWS-0060 drive is a reliable and versatile performer that is easy to use and reasonably fast. The hardware—tape drive and controller—responded flawlessly to commands, and according to Sigma, the completed software should be ready by the time you read this. Overall, this is a solid tape backup device whose performance should improve considerably once the software is completed. —Joe Desposito ■

Frank J. Derfler, Jr., is a contributing editor of PC Magazine. Vincent Puglia, Joe Desposito, and Phil Wiswell are frequent contributors to PC Magazine.

## Tape Backup Systems: Summary of Features

Product Company	List price	Price per megabyte	Type of medium	Capacity (mega-bytes)	Size/type of interface card	Price of card alone	Size of unit (inches)	Error-correction technique	Type of backup	Appends file to tape	Uses archival bit	Has automatic backup
5210 FloppyTape Backup System Cipher Data Products Inc.	XT: \$1,095 AT: \$1,195	\$43.80	DC 600A cartridge	25	XT uses floppy controller, AT uses half-length card	XT, n/a* AT, \$149	16 x 8 x 5 1/2	CRC**	File-by-file	Yes	Yes	No
Ganea Galaxy 3220T Ganea Systems Corp.	\$1,095	\$59.95	TEAC CT 450 or CT 500 cassette	20	Half-length card	\$179	8 1/4 x 5 1/2 x 16	CRC**, read-after-write	Mirror-image or file-by-file	Yes	Yes	No, but under development
Ganea Galaxy 3260 Ganea Systems Corp.	\$1,400	\$24.00	DC 600A cartridge	60	Half-length card	\$329	16 x 8 1/4 x 5 1/2	QIC (incl. CRC)	Mirror-image or file-by-file	Yes	Yes	Yes
HP 9142A Hewlett-Packard Co.	\$1,889	\$31.48	Hewlett-Packard 60 cartridge 92242L or 92245	60	Half-length card	\$199	12 1/2 x 5 1/2 x 11 1/4	Exclusive or 50% redundancy method	Mirror-image or file-by-file	Yes	No	No
I <sup>2</sup> TAP10 I <sup>2</sup> Interface Inc.	\$995	\$99.50	DC 1000 or TC 200 minicartridge	10	Floppy controller	n/a	8 1/4 x 3 1/2 x 15	CRC**, read-after-write	Mirror-image or file-by-file	Yes	Yes	No
I <sup>2</sup> TAP45X I <sup>2</sup> Interface Inc.	\$1,795	\$39.89	DC 300XL cartridge	45	Short board	\$250	15 x 8 1/4 x 3 1/2	QIC-24 (incl. CRC), read-after-write	Mirror-image	No	No	No
LI-60605 Lintec Inc.	\$895	\$14.92	DC 600A tape cartridge	60	Long board	\$285	8 1/2 x 5 1/2 x 12 1/2	QIC-36 (incl. CRC), read-after-write	Mirror-image or file-by-file	Yes	Yes	No
M10 Micro Design International Inc.	\$525	\$52.50	Micro Design's 3 1/4" tape reel	10	Floppy controller, optional free cable for AT and compatibles	n/a	10 x 3 x 9	ECC†	Mirror-image	No	No	No
PC-60 Alloy Computer Products	XT: \$995 AT: \$1,190	\$16.58	DC 600A cartridge	60	XT uses floppy controller, AT uses half-length card	XT, n/a* AT, \$195	5 1/4 x 8 1/4 x 15 1/4	CRC**, read-after-write	File-by-file	Yes	Yes	No
SWS-0060 Sigma Designs Inc.	\$1,595	\$26.58	Sigma's self-threading one-reel tape	60	Short board	\$195	14 1/2 x 8 x 5 1/4	CRC**, read-after-write	Mirror-image or file-by-file	Yes	No	Yes
Sysgen QIC-Fild Sysgen Inc.	\$1,495	\$24.91	DC 600A cartridge	60	Short board	\$210	2 x 6 x 9 1/2	ECC†	Mirror-image or file-by-file	Yes	Yes	Yes, (default)
Tecmar QIC-60H Tecmar Inc.	\$2,144	\$35.73	DC 600A cartridge	60	Short board	\$149	7 x 3 1/4 x 15 1/2	CRC**, read-after-write	Mirror-image or file-by-file	Yes	Yes	Yes, from BAT or BASIC programs
The MaynStream 20 Maynard Electronics	\$1,595	\$79.70	Maynard's 1/4" streaming tape	20	Short board	\$395	15 x 6 x 4	ECC†	File-by-file	Yes	Yes	No

\*n/a = not applicable \*\*CRC = Cyclical Redundancy Check †ECC = Error-Correcting Code

# "Her smile was so enchanting,"

"there was no way I could refuse her.  
So when she asked me to help her write the Annual Report,  
I was ready and willing."

✓ denotes IBM-AT compatibility.

## SOFTWARE

We only carry the latest versions of products.  
Version numbers in our ads are current at  
press time

### Alpha Software

✓Keyworks	\$49.
✓DataBase Manager II 2.02	169
✓Electric Desk 1.1	195.

### Aptec

✓Rainbow Writer Color Text Formatter 2.1	119.
✓Rainbow Writer Screen Grabber 1.1	69
✓ColorScreenPrint 2.0	59

### Ash-ton-Tate

✓dBase II 2.43	call
✓dBase III	call
✓Framework II	call

### Best Programs

PC Connection 15-day money back guarantee  
on these Best Programs.

✓PC/Tax Cut (1986 version for 1985 taxes)	124.
✓Personnel Series Level I	279
✓Personnel Series Level II	419
✓Personnel Series Level III	559
✓Personal Finance Program 2.0	65.
✓Professional Finance Program 4.0	149.
✓PC/Fixed Asset System 3.0	329.

### Bible Research

✓THE WORLD 3.0 (KJV Bible)	157.
✓THE WORLD 3.0 (NIV Bible)	157.

### Borland International

✓Turbo Tutor 1.0	19.
✓Turbo Database Toolbox 1.1	30.
✓Turbo Graphix Toolbox 1.0	30.
✓Turbo Editor Toolbox 1.0	37.
✓Turbo Gameworks 1.0	37.
✓Turbo Newpak (Gameworks and Editor)	52.
✓Turbo Lightning 1.0 (w/spelling dictionary and thesaurus)	57.

✓Sidekick 1.5 (copy-protected)	30.
✓Sidekick 1.5 (non-protected)	48.
✓Reflex 1.0	57.
✓Superkey 1.1	37.
✓Superkey/Sidekick Package (includes \$15 rebate coupon from Borland)	67.

✓Turbo Pascal 3.0	37.
✓Turbo Pascal 3.0 w/BCD	59.
✓Turbo 8087 3.0	59.
✓Turbo 8087 3.0 w/BCD	72.
✓Turbo Holiday Pak (Pascal 3.0, Tutor, and Database Toolbox)	67.
✓Turbo Holiday Jumbo Pak (Pascal 3.0, Database, Editor & Graphics Toolboxes, Tutor and Gameworks)	139.

## PC Connection Software Special

through February 28, 1986

### MICROSOFT

#### Windows

Get the whole picture as you work back  
and forth between multiple applications,  
and pass information between standard  
DOS and Windows applications.

Includes:

- MS DOS Executive (DOS file manager and Microsoft Windows Write and Paint)
- Clock/calendar, alarm, notepad and calculator
- Clipboard (to view copied applications)
- RAM drive and print spooling control panel

For the IBM-PC, XT and AT ..... \$62

### BPI Accounting Software

✓General Ledger C.13	289.
✓Accounts Payable C.13	289.
✓Accounts Receivable C.13	289.
✓Business Builder (G/L, A/R, A/P, Payroll, information management, spreadsheet, business graphics and word processing)	399.

### Breakthrough

✓Timeline 2.0	249.
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### Broderbund

✓Bank Street Writer	49.
✓Print Shop	35.
✓Graphics Library #1	22.

### Conceptual Instruments

✓The Desk Organizer 2.0	59.
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### Connecticut Software

✓Sideline 5.0	37.
✓Printer Boss 5.0	99.

### Dec Software

✓Dec Easy Word	32.
✓Dec Easy Accounting 1.0	45.

### Decision Resources

✓Chart-Master 6.1	237.
✓Diagram-Master 5.0	207.
✓Sign-Master 5.1	157.

### Digital Research

✓GEM Desktop 1.2	30.
✓GEM Draw 1.2 (includes Desktop)	93.
✓GEM Collection 1.2 (includes Desktop, Paint and Write)	119.

### Dow Jones

✓Market Manager +	\$145.
✓Spreadsheet Link	145.
✓Membership Kit	19.

### Enertronics

✓Energraphics 1.3	165.
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### Evergreen

✓One Write Plus 1.0	169.
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### Financial Software

✓Financial II 2.1	59.
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### Friendlysoft

✓Friendly Writer 3.2 (w/Friendly Speller)	55.
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### Funk Software

✓Sideways 3.0	37.
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### Graphic Communications

✓Graphwriter Combo Set	305.
✓Freelance	209.

### Harvard Associates

✓PC LOGO 2.0	89.
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### Harvard Software

✓Harvard Project Manager 1.16	209.
✓Harvard Total Project Manager 1.0	299.

### Human Edge

✓Mind Prober	27.
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### Infocom

✓Comerstone 1.0	279.
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### Lifetree

✓VolksWriter 3	159.
✓VolksWriter Scientific 1.0	289.

### Living Videotext

✓Think Tank 2.0	109.
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### Ready 1.0

✓Micro Education (MECA)	54.
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✓Jim Fox Running Program 1.2	49.
✓Managing Your Money 2.0	99.

### Micropro

✓Easy 1.0	97.
✓WordStar 3.31	179.
✓WordStar Propak 3.31	259.

Hard disk recommended for Wordstar  
2000 & Wordstar 2000 Plus

✓WordStar 2000 1.01	259.
✓WordStar 2000 Plus 1.01	299.

### Microim

✓Extended Report Writer 1.2	85.
✓Clout 2.0	135.
✓R-base 5000 1.01	369.
✓Upgrade Kit to R-base 5000	129.

### Microsoft

✓Multiplan 2.0	119.
✓Microsoft Word 2.01 (w/Ready)	247.
✓Microsoft Project 2.0	call
✓Microsoft Chart 2.0	call
✓Windows 1.0	special

# PC CONNECTION®

# "But was I able?"

"She wanted to know every little detail of my configuration. 'Don't you have a hard disk?' she asked sweetly. 'What word processor do you use? Can you do dual-document editing?'"

The following Microsoft mice now come with PC Paintbrush 3.0 software:

Microsoft Bus Mouse with software 5.0 \$135.  
Microsoft Serial Mouse with software 5.0 135.

## LANGUAGES

Quick Basic 1.0 ..... 69.  
Pascal Compiler 3.31 ..... 175.  
Macro Assembler 4.0 ..... 105.  
Fortran Compiler 3.31 ..... 205.  
Basic Interpreter 5.28 ..... 205.  
Basic Compiler 5.36 ..... 235.  
C Compiler 3.0 ..... 235.  
Business Basic Compiler 1.10 ..... 258.

## Microsoft

InfoScope 1.03 ..... 45.  
Crosstalk XVI 3.6 ..... 95.  
Remota 1.3 ..... 95.  
Transporter 1.4 (includes Crosstalk) ..... 169.

## Multimate International

Just Write 1.0 ..... 79.  
MultiMate 3.31 ..... call.  
MultiMate Advantage 3.6 ..... call.

## Nantucket Software

Clipper ..... 349.  
Peter Norton

Norton Utilities 3.1 ..... 59.

## Powerbase Systems

Powerbase 2.1 ..... 197.

## Quarterdeck

DesqVIEW 1.0 ..... 65.

## Rosesoft

Prokey 4.0 ..... 89.

## Satellite Software

WordPerfect 4.1 ..... 239.

## Scarborough Systems

Your Personal Net Worth 1.1 ..... 59.

## Simon & Schuster

Webster's New World Speller 1.2 ..... 39.

## Softstyle

Printworks 1.05 ..... 39.

## Software Digest

Ratings Newsletter

This publication is unparalleled for its comprehensive, reliable evaluations. 1985's issues evaluate the following programs: word processors, file mgt., database mgt., spreadsheets, graphics, integrated acctg., project mgt., communications, integrated productivity.

Single copy ..... 24.50.

Year subscription ..... 245.00.

## Software Group

Enable 1.1 ..... call.

## Software Publishing

PFS:Profit B.00 ..... 59.

PFS:Report B.01 ..... 77.

PFS:Access A.00 ..... 84.

PFS:File B.01 ..... \$84.

PFS:Graph B.01 ..... 84.

PFS:Plan A.01 ..... 84.

PFS:Write C.00 (w/PFS:Proof) ..... 84.

First Success (Combo Pack includes PFS: Write, Proof, Plan, File) ..... 229.

## Sorcim/IUS

SuperCalc 3 2.1 (w/Sideways) ..... 199.

## Spectrum Holobyte

Art Studio ..... 32.

Executive Picture Show ..... 139.

## Springboard

Newsroom ..... 35.

Clip Art Volume 1 (for Newsroom) ..... 19.

## Unison

Art Gallery 1 ..... 22.

Printmaster 1.1 ..... 37.

## United Software

Einsteinwriter 7.2 (w/coupon for free Speller) ..... 99.

In-House Accountant 2.05 ..... 109.

ASCII Pro 4.23 ..... 69.

## Xanero

Ability 1.0A ..... call.

## TRAINING

### ATI

#### SKILL BUILDER PROGRAMS

Intro and How To Use:

Word Processing MS-DOS

Business Software PC-DOS

Data Bases Typing Tutor

Compaq BASIC

IBM-PC ..... each 38.

#### TRAINING POWER PROGRAMS

How to Use:

dBase II dBaseIII Lotus 1-2-3

MS Word Supercalc 3 Multimate

Multipan Wordstar Framework

Wordperfect Symphony Displaywrite 3

..... each 49.

#### Friendlysoft

PC Intro Set ..... 35.

#### INDIVIDUAL SOFTWARE

The Instructor II ..... 35.

Professor DOS ..... 47.

Tutorial Set (both items above) ..... 75.

Professor Pixel ..... 47.

Typing Instructor ..... 39.

Training for Lotus 1-2-3 ..... \$49.

Training for dBase III ..... 49.

Training for Project Management ..... 49.

## Scarborough Systems

MasterType ..... 26.

## Simon & Schuster

Typing Tutor III ..... 33.

## EDUCATIONAL

### Barron's

Computer SAT ..... 59.

### Designware

Spellicopter (ages 6 to adult) ..... 25.

Mission Algebra (ages 13 to adult) ..... 27.

European Nations (ages 9 to adult) ..... 27.

Grammar Examiner (ages 9 to adult) ..... 27.

States and Traits (ages 9 to adult) ..... 27.

### Digital Research

Diagnostic Test (PSAT) ..... 14.

OwlCat SAT (15 hours) ..... 63.

OwlCat SAT (60 hours) ..... 169.

### Edware

Algebra 1 ..... 22.

Algebra 2 ..... 22.

Algebra 3 ..... 22.

### Harcourt Brace Jovanovich

Computer SAT ..... 49.

Computer GRE ..... 57.

### Scarborough Systems

Build-a-Book (ages 2 to 12) ..... 19.

### Simon & Schuster

Lovejoy's SAT ..... 39.

### Spinnaker

All Spinnaker products now work with

DOS 2.x and 3.x.

Educational Games for Young Computer

Users. (All require graphics board)

Face Maker (ages 3 to 8) ..... 18.

Kids on Keys (ages 3 to 9) ..... 18.

Fraction Fever (ages 7 to adult) ..... 18.

Kinder Comp (ages 3 to 8) ..... 18.

Alphabet Zoo (ages 3 to 8) ..... 20.

Kidwriter (ages 6 to 10) ..... 20.

Trains (ages 3 to 8) ..... 20.

Snooper Troops I (ages 10 to adult) ..... 23.

Snooper Troops II (ages 10 to adult) ..... 23.

In Search of the Most Amazing Thing

(ages 10 to adult) ..... 23.

Delta Drawing (ages 4 to adult) ..... 27.

President's Choice (ages 13 to adult) ..... 27.

### Springboard

Fraction Factory (ages 8 to 14) ..... 19.

Make A Match Math (ages 2 1/2 to 6) ..... 19.

Piece of Cake Math (ages 7 to 13) ..... 22.

Early Games for Young Children

(ages 2 1/2 to 6) ..... 22.

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PC Connection

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603/446-3383

For the IBM-PC Exclusively.

PC CONNECTION®

# "I knew we were compatible,"

"but if I didn't get more memory,  
an on-line Thesaurus, and Automatic Outlining  
in a hurry, the only thing getting the boot  
would be me."

## Springboard (continued)

Music Maestro (ages 4 to 10).....	\$22.
Easy As ABC (ages 3 to 6).....	24
<b>Stone</b> (requires graphics board)	
Across the U.S.A. (ages 5 and up).....	22.
My Letters, Numbers, Words (ages 1 to 5).....	29
Kids Stuff (ages 3 to 8).....	29
Memory Master (ages 3 to 8).....	29.
<b>The Learning Company</b>	
Addition Magician (ages 6 to 10).....	23
Magic Spells (ages 6 to 10).....	23
Word Spinner (ages 6 to 10).....	23
Reader Rabbit (ages 5 to 7).....	26
Moptown Hotel (ages 8 to 13).....	26
Number Stumper (ages 6 to 10).....	26
Moptown Parade (ages 8 to 12).....	26
Rocky's Boots (ages 9 and up).....	32.

## RECREATIONAL

<b>Blue Chip</b>	
High finance simulations.....	
Baron.....	32.
Millionaire.....	32
Squire.....	32
Tycoon.....	32
<b>Broderbund</b>	
Championship Lode Runner.....	23.
Ancient Art of War.....	27.
<b>CBS</b>	
Murder By The Dozen (your turn, Sherlock).....	21.
<b>Electronic Arts</b>	
Pinball Construction Set.....	25.
Dr. J. Larry Bird One-on-One.....	28
Music Construction Set.....	28.
<b>Friendlysoft</b>	
PC Arcade.....	35.
<b>Funtastic</b>	
Among the finest arcade style games available.....	
Cosmic Crusader.....	27.
Snack Attack II.....	27.
Big Top.....	29
Master Miner.....	29
<b>Hayden Software</b>	
Sargon III (highest rated Chess program).....	35.
<b>Intocom</b> Difficulty levels shown in italics	
JUNIOR.....	
Seastalker.....	25
<b>STANDARD</b>	
Enchanter.....	the Witness
Cutthroat.....	Planetfall
Wishbringer.....	Zork I
Hitchhiker's Guide.....	each 25.

## ADVANCED

Zork II.....	Zork III.....	Infinite.....
Sorcerer.....	Suspect.....	
A Mind Forever Voyaging.....	each \$29.	

## EXPERT

Deadline.....	Starcross.....	Suspended.....
Spellbreaker.....	each 31.	

Invisicles (hint booklets) are available for most Intocom games. Specify game... 6.

## Microleague Sports

Microleague Baseball (you are the manager).....	25.
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## Microprose

F-15 Strike Eagle.....	22.
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## Microsoft

Flight Simulator 2.12 (now works with Hercules Mono Card).....	32.
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## 1Step Software

Golf's Best (Pinhurst or St. Andrew's).....	32.
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## Origin Systems

Ultima III.....	39
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## Parlor Software

Bridge Parlor (the best Bridge simulation).....	49
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## PCSoftware

Championship Blackjack.....	23.
Chess 2001.....	27.

## Armchair Quarterback

.....	27.
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## SEGA

Spy Hunter.....	29
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## Sierra On-Line

Championship Boxing.....	24.
Ulysses.....	24.

## King's Quest

King's Quest II.....	33.
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## Star-Tech

Wizardry.....	42.
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## Spectrum Holobyte

GATO.....	27.
Telstar (w/Halley's Comet).....	32.

## Sublogic

Night Mission Pinball.....	29.
Jet.....	33.

Sox scenery (airport) disks are available for Jet..... each 15.

## Telerium

Rendezvous with Rama.....	27.
Amazon.....	27.

## Fahrenheit 451

## XOR

NFL Challenge (be the coach).....	\$79
-----------------------------------	------

## HARDWARE

### AST Research

All AST Boards come with a full one year warranty.

SixPakPlus 64k upgradeable to 384k, with clock calendar, serial & parallel ports & now includes Sidekick version 1.5 non-copy protected (game port optional)..... 225.

384k (fully populated)..... 249

MegaPlus II 64k upgradeable to 256k (or more with MegaPlus) with clock calendar and serial port (parallel, game, or second serial port optional)..... 249.

I/O Plus II with clock calendar and serial port (parallel, game, or second serial port optional)..... 125.

Parallel, game, or second serial port for any AST board (specify board)..... 35.

AST-5251-11..... 579.

AST-3780..... 579.

Reach Modem half card 300/1200 baud internal modem includes Crosstalk XVI..... 349.

Advantage 128k upgradeable to 1.5 Meg (or more with Piggyback Card), with serial, parallel ports, now includes Sidekick version 1.5 non-copy protected (game port and second serial port optional)..... 399.

RAMpage! upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS)..... call

### Amdek

Video 300G composite monitor (green)..... 129

Video 300A composite monitor (amber)..... 139

Video 310A mono monitor (amber)..... 169

Color 600 - RGB monitor..... 399

Color 710 - RGB monitor..... 449

### CompuCase

Plastic Keyboard & Drive Cover Set..... 17.

IBM Mono Screen Enhancement..... 17.

### Cuesta

Uninterruptible power backup units

Datasaver 240 WATT..... call

Datasaver 400 WATT..... call

### Curtis

#### ACCESSORIES

PC Pedestal (for IBM Mono or Color)..... 37.

Portable Pedestal..... 47.

System Stand..... 19.

System Stand for IBM-AT..... 37.

Low Profile Tilt and Swivel Pedestal..... 37.

Crystal 300-watt (line conditioner)..... 159.



# "So I asked for her number."

"She just smiled  
and handed me a slip of paper.

'Before you try to connect with me, you better  
connect with them.'"

## CABLES

AC Plug Adapter (any monitor to your PC) 8.	
Smartmodem to IBM Cable.....	\$17.
Keyboard Extension Cable (3 to 9 feet) 27	
Extension Cables for IBM Mono Display 33	
Color and Monochrome Extension cables 39.	
Printer-to-IBM cable.....	17.

## SURGE SUPPRESSORS

All surge suppressors have an on/off switch.	
Safeslip.....	21
Diamond (6 outlets).....	29
Emerald (6 outlets; 6 ft cord).....	36
Sapphire (3 outlets; EMI/RFI filtered).....	47
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord) 55.	
Command Center (5 outlets; EMI/RFI filtered; digital clock; master key switch; circuit breaker).....	123.

## Data Products

8050 color printer.....	cell
8070 color printer.....	cell

## Epson

All Epson dot matrix printers have built in graphics capability. In addition, the LX-80, FX-85, FX-185 and LX-90 can all print in near letter quality (NLQ).

DX-10 (letter quality).....	cell
DX-20 (letter quality).....	cell
DX-35 (letter quality).....	cell
FX-85.....	cell
FX-286 (replaces FX-185).....	cell
LX-80.....	cell
LX-80.....	cell
LX-90.....	cell
LQ-1500 (letter quality dot matrix).....	cell
SQ-2000 Ink Jet.....	cell
Epson Books.....	cell
Printer-to-IBM cable.....	15.

We are an authorized Epson service center. Ask about the extended service plan.

## FTG

Light Pen.....	195.
Demo Disk for Light Pen.....	39

## Hayes

Smartmodem 300.....	149
Smartmodem 1200.....	389.
Smartmodem 1200B (w/Smartcom II).....	349.
Smartmodem 1200B (no software).....	289
Smartmodem 2400.....	579.
Smartcom II 2.1 (software).....	89
Transet 1000.....	289
Accessory Kit for Transet 1000 (cable and software).....	29

## Hercules

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# TECHNOLOGIES IN COMPETITION

It's not a question of if, but when. At some time or other, whether because of a software bug, a power glitch, an operator error, or an apparently inexplicable head crash, the data on your hard disk is going to be unrecoverable. And as the applicable corollary of Murphy's Law puts it, the probability of hard disk data loss is directly proportional to the importance of the data and inversely proportional to the frequency of data backup.

There are a variety of ways to protect yourself against catastrophic data losses. The most familiar, of course, is to back up at least the most crucial material onto floppy disks. But floppy disk backup is reasonable only for individual programs or relatively short groups of files. When it comes to ensuring the entire contents of a 10- to 30-megabyte (or larger) fixed disk, floppy backup is just too expen-

sive, both in media and in time. Put simply, it doesn't get done.

While there are other backup alternatives worthy of consideration, in this issue we've chosen to concentrate on the most widely used backup medium. Magnetic tape offers the longest successful track record and the lowest cost per byte.

**MEDIA OPTIONS** The 3M Corp. introduced 1/4-inch data cartridges as long ago as 1971, when it became apparent that smaller computers required the use of a more appropriately sized alternative to the 1/2-inch open-reel tape systems that have traditionally dominated the mainframe world.

Today's standard-size 1/4-inch data cassettes, used in the now-common 9-track format, are available with tape lengths of 300, 450, and 600 feet, which correspond (roughly) to storage capac-

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Myriad tape backup formats, sizes, and methods  
are vying to become the industry standard.  
The most popular, 1/4-inch tape, incorporates  
three more competing technologies.

---

# T ■ A ■ P ■ E BACKUP



## ■ TAPE BACKUP TECHNOLOGIES

ities of 30, 45, and 60 megabytes. Indeed, the high-density tape formulations used in the 600-foot tapes can be reliably pushed to 134 megabytes.

Although the cartridges were originally designed for minicomputers, backup capacities in this range also nicely cover the requirements of PC-XTs and PC ATs. 3M is the largest supplier of such media, with Data Electronics Inc. (DEI) the dominant secondary source.

Regular DC300 and DC600 series data cartridges measure approximately 4 by 6 by 1/4 inches. While this size is appealingly small from the perspective of data processing managers, it often seems inconvenient to attorneys, doctors, and other business professionals whose experience of tape has been principally limited to Philips audio cassettes.

Appealing especially to these latter users are the DC1000 minicartridges, which measure only a bit over 2 by 3 by 1/4 inches and use nine tracks to record up to 10 megabytes on a 1/100-inch-wide tape. (The I<sup>2</sup> Interface I<sup>2</sup>TAP10 unit reviewed in this survey uses this minicartridge.) Just introduced, and certain to attract both drive manufacturers and users, the DC2000 minicartridge is the same shirt-pocket size. It uses high-density 1/4-inch tape and can hold 20 to 40 megabytes, depending on whether it is recorded using 12 or 24 separate tracks. These capacities, again, make a good match for somewhat smaller microcomputer backup needs. Moreover, such cartridges permit drive designers to think in terms not only of the standard 5 1/4-inch disk "form factor" but also the (presumably) upcoming transition to 3 1/2-inch drives.

Finally, TEAC, Maxell, Memtek (formerly Memorex), and Verbatim produce genuine digital cassettes visually almost indistinguishable from the audio variety. Operating at 90 inches per second (like most full-size data cartridges today), these tapes hold 20 megabytes on four recorded tracks and, according to Richard Newcome of Sysgen, offer the same data reliability as their larger siblings. (The same could not be said for the audio cassettes pressed into digital service by Apple and Commodore.)

While these systems make up your primary tape backup media choices, not all

microcomputer tape backup systems today use even the standard-size 1/4-inch data cartridges in the same way. There are three principal contending systems built around the use of the 1/4-inch data cartridge: those that follow the QIC (Quarter-Inch Compatibility) Committee standards; the PC/T system recently introduced by Tallgrass;

■ The oldest and largest industry group, the QIC Committee, has agreed on standards for nearly every aspect of 1/4-inch data cartridge performance.



and so-called "floppy tape" systems, associated most prominently with Cipher, but represented by other manufacturers, as well.

**THE QIC APPROACH** The oldest and largest industry group, the QIC Committee, has managed to agree on standards for nearly every aspect of 1/4-inch data cartridge performance. Interconnections, interfaces, formats, and error correction are all covered—with the one exception that a tape made on one company's QIC backup system cannot always be read on machines made by another QIC company. (A QIC committee has been established, jointly chaired by Alloy and Sysgen, to correct this anomaly.) QIC standards have been

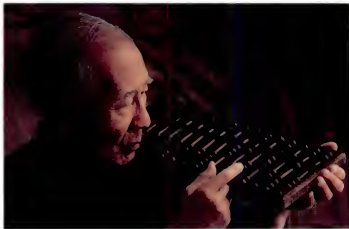
accepted by such stalwarts as NCR and Burroughs and have a wide appeal throughout the minicomputer industry. (In the accompanying reviews, models from Alloy (Aptec), Genoa, Tecmar, Sigma, Sysgen, Lintec, Maynard, and I<sup>2</sup> Interface are QIC-oriented units.)

Basically, the current QIC-24 standard calls for the use of nine tracks, which are recorded in a serpentine pattern. (When the end of the tape is reached on one track, the tape direction is reversed and the head repositioned so that the next track is recorded "backward." The tape need not be rewound between each of its nine passes.) A tape head with separate read and write gaps is used, so that data written to the tape can instantly be read and compared against the original, ensuring against errors. Tapes are erased in a single pass, and when Track 0 is written, the whole tape is erased. Tapes do not need preformatting before use. Either image or file-by-file backup/restore operation is permitted. To see the implications of these provisions, it's well at this point to turn to the second major 1/4-inch data cartridge format.

**THE PC/T APPROACH** While we were unable to test the Tallgrass TG-4060 Tape Storage System in time for this issue (we will test it soon, though), no discussion of divergent approaches to tape backup philosophy today could ignore that company's most significant recent contribution: PC/T. The acronym stands for "Personal Computer/Tape," and it represents a fundamentally different way of ensuring the integrity of data backup.

As indicated, QIC-24 systems use a read-after-write head to catch and correct errors "on the fly." A bad byte is immediately rewritten until the tape gets it right. With such an approach, however, there is no way to detect data errors that may arise on subsequent reads. A loose oxide particle, for example, that adheres momentarily to a head and is later dislodged and redeposited on the tape downstream will cause an undetectable error. In the QIC view, such errors are too rare to merit more attention than specifying the use of top quality tape.

The PC/T system takes an opposite approach. In this system, a single head is used to write data to the tape in two blocks



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Personal computers have come a long way. Unfortunately, tape backup systems have not. Their functions are primitive, they're frightening to install and truculent to use.

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You'll want to use the batch mode for routine operations though, because it allows you to create a "file"

to contain those operations and run them automatically, just by hitting a few keys.

But probably the best example of just how downright civil the Galaxy systems can be is our auto backup. You just preset the time and the desired function, and the system does the rest. Automatically.

No other tape backup systems, by the way, operate this simply.

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of 4 kilobytes each. Using the same data that was fed to the first two blocks, a third, parity block is then constructed and written by performing an exclusive-or (XOR) operation. In this way, if for any reason one data block is corrupted, it can be identified and correctly reconstructed—during playback—by applying the same XOR procedure to the remaining two blocks. To minimize the possibility of two successive blocks being corrupted by a defect on the tape, they are physically separated by interleaving with other unrelated data/parity blocks.

Very little media is wasted for "system overhead" in the QIC-24 approach, but time is often lost in finding a specific file by having to access it sequentially. While no time-consuming preformatting pass is required, any time Track 0 must be written to, the whole tape is erased and must be rewritten.

The penalty PC/T pays for its data integrity protection is the large amount of tape overhead, for which Tallgrass compensates by increasing the number of its tracks (on standard data cartridges) from 9 to 11. A second penalty is the need for an extensive (roughly 2 hours) one-time formatting pass before a new tape is put into service. A compensating dividend of this procedure is that it subsequently allows directory-oriented random access to (and updating of) individual files without having to rewrite (or append to) an entire tape.

Both the (more) standardized QIC-24 and the PC/T formats have obvious merit to their conflicting claims, yet neither has shown (to date) markedly better error-free performance than the other. One point raised by an industry spokesman may be significant, however. While currently the 9-track QIC tapes produced by different manufacturers are not automatically interchangeable, with nothing more than suitable software they could be made so. On the other hand, a 9-track QIC machine will never be able to read an 11-track PC/T tape. The two formats are thus as incompatible as those of VHS and Betamax videocassette machines. While PC/T has been accepted as a standard (QIC-100), *Data Storage Report* (Volume 1 Number 6, August 1985, p. 13) indicates that the scope of this approval is currently limited to the DC2000 minicartridges that will be

primarily targeted at the upcoming 3½-inch form factor drives.

**TREATING TAPE AS A FLOPPY** Both QIC and PC/T backup systems require use of a separate tape controller—normally a half- or full-length board that plugs into one slot of the PC. (Software is added, as

■ **Tape backup systems that use the PC's own floppy disk controller and connect to the PC's bus output have recently been developed.**



well, through adding a DEVICE = line in your CONFIG.SYS file and copying the manufacturer's software into your root directory.) Such boards represent an expense, of course, and not infrequently spare PC slots are thus made dearer still. For these reasons, tape backup systems that use the PC's own floppy disk controller and connect to the PC's bus output connector have recently been developed by Cipher and others.

Floppy tapes, like floppy disks, require a formatting pass, and, as in the PC/T format, a bad-sector table is constructed to block out clearly bad areas. Further, they are limited in storage capacity to the 32 megabytes (25 megabytes formatted) that the current versions of DOS can handle,

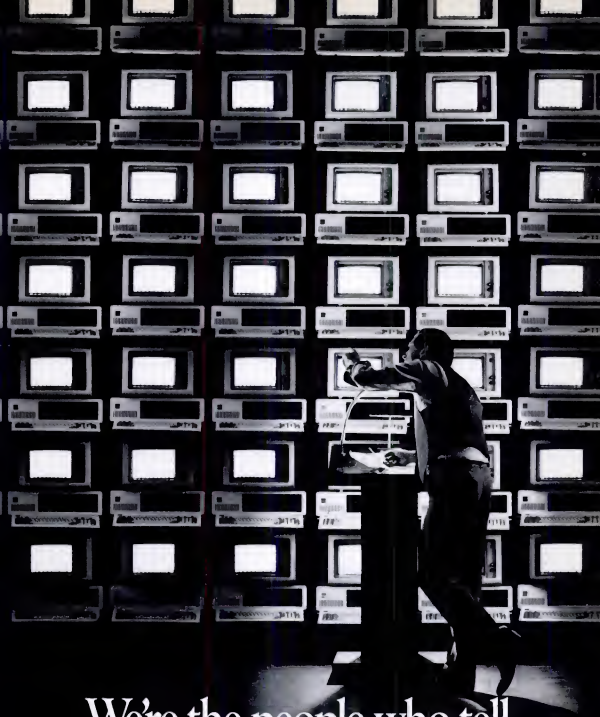
and micros such as the PC AT must be retrofitted with an appropriate bus connector. On the other hand, for backup of a number of units in an office, a single floppy-tape drive can easily be moved from machine to machine, since an internal controller board is not required in each. The claims for error rate ( $1 \times 10^{-11}$ ) are as good as or better than those for the other systems, though a different error detection/correction scheme is used.

A conventional floppy disk head (which is used by Cipher's 5210 Floppy-Tape Backup System) contains a single head gap that serves for both writing and reading. When you copy a file with the /V (verify) option, the head writes the data on the floppy, then switches to the read function and verifies it on the next pass. In the case of a DC600 tape with six tracks and 25 megabytes to be recorded on it, while one could stop, rewind, and replay each sector to verify it, the time it would take to do so is not very appealing.

According to Cipher's Rick Luttrall, for each 16 sectors written to tape, a 17th is added for parity checking (CRC). The system permits recovery, during replay (without rewriting) of the data for one bad sector encountered, and if two or more are found, the area is flagged and the user may choose to rewrite.

**BEYOND 5/4-INCH** While there is a D-CAS Committee for digital cassettes that roughly corresponds to the QIC Committee, to date this is a much less standardized marketplace. (On the other hand, the Genoa digital cassette unit tested here (the Galaxy 3220T) follows a QIC-4 standard, with a 90-inch-per-second, nine-track, serpentine format similar to its QIC-24 data cartridge unit.) Both 3M and Tallgrass have a strong interest in ensuring that the new DC2000 minicartridges will be very firmly standardized.

The DC2000 represents new growth among smaller-capacity tape backup systems. At the other end of the scale, even as this is being written, Cipher is introducing a 200-megabyte drive to use IBM's new 5/4-inch chromium dioxide cartridges. Wherever your backup needs fall, therefore, there are products aplenty from which to choose. And not to choose is to make sure you'll lose. ■



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than first generation Multiplan. (And faster than even the latest version of 1-2-3\* in most uses.) While Multiplan macros reduce repetitive command sequences to a single keystroke.

Multiplan reads and writes 1-2-3 files with one deft command. So you can share spreadsheets painlessly from PC to PC. It's also the only spreadsheet that offers linking. Along with true model consolidation. (In batches, or one at a time.) All in one command.

So you can overwhelm those huge models. Not vice versa.

Yet, for all its power, Multiplan is a breeze to manage. Like you, it works intuitively. So you can deal with the most demanding jobs quickly and naturally.

If you're looking for your basic super spreadsheet — without the super pricetag — Multiplan is the one you'll want. In a crunch.

## Microsoft Chart.

For best performance in a supporting role.

Chart, which from the start has stood at the top in business graphics, is now offered in a new version. And a real dazzler it is.

When you're the one making the presentation, Chart backs you up with superior firepower in support of your arguments. Not only in black and white

and on paper, but in vibrant color, directly on high-resolution 35mm slides and overheads. And of course, Chart drives all the popular dot matrix printers, laser printers, and color plotters.

No other program comes near Chart's versatile talents. Choose from 177 colors. And graph formats of every description: bar, area, pie, column, high-low, and scatter charts. Up to 16 charts to a page. Add text anywhere in countless type styles. Move, size, or shift.

And now Chart links directly with Lotus\* 1-2-3. As well as Microsoft Multiplan. So when the numbers change, the charts change, automatically. It works wonders, too, with VisiCalc,\* dBASE III,\* R:BASE 5000,\* and a chorus of others.

So before you face another meeting, prepare yourself with Microsoft Chart. And enjoy the advantage of graphic superiority.

## Microsoft Access.

The great communicator.

Access is our highly acclaimed new contribution to communication. Your link to the vast information stored in data services and your company mainframe. Because Access has the brains to take you by the hand and walk you through these often frustrating mazes.

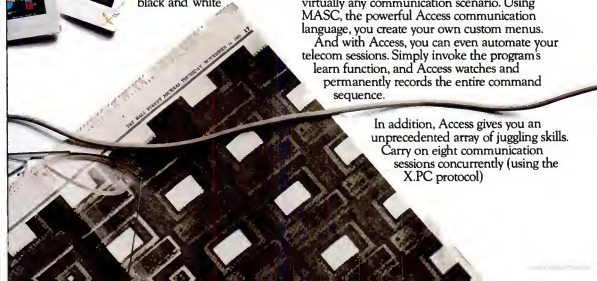
It comes with menus for the most popular services, including Dow Jones,<sup>SM</sup> CompuServe,<sup>®</sup> MCI Mail,<sup>®</sup> EasyLink,<sup>SM</sup> OAG,<sup>®</sup> and NewsNet.<sup>SM</sup>

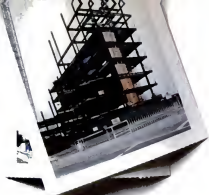
Even better, Access gives you a way to simplify virtually any communication scenario. Using MASC, the powerful Access communication language, you create your own custom menus.

And with Access, you can even automate your telecomm sessions. Simply invoke the program's learn function, and Access watches and permanently records the entire command sequence.

In addition, Access gives you an unprecedented array of juggling skills.

Carry on eight communication sessions concurrently (using the X.PC protocol)





displaying them each in their own window. Contact two data services through two modems at once. Edit on-line or off line, and export that data into programs like 1-2-3 and Multiplan.

So you could, for instance, monitor every stock exchange. Collect quotes and price histories. Edit that info for a report. While sending the updated numbers to your spreadsheet. And do it routinely.

Microsoft Access. When you need to dig out information, it's a bulldozer.

### Microsoft Project.

So you won't get buried by major undertakings.

This is the program that brings method to the madness of long and complex enterprises. Tasks made more manageable by Microsoft Project's adaptability. And by its easy-to-learn, uniquely intuitive operating style.

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And scheduling from minutes to months.

We also make sure it won't be a major project to learn Microsoft Project. Included with the software is a complete course on a Computer Based Training disk. A uniquely talented teacher with the ability to "coax" you to success.

Microsoft Project. It makes sure the best laid plans get carried out on schedule.

### Microsoft Mouse.

When pointing is quicker than typing.

The new Microsoft Mouse is designed to exploit fully the abilities of Microsoft Word and Windows, Microsoft Project and Multiplan 2.0. If you use programs like Lotus 1-2-3, WordStar, DisplayWrite,® our Mouse will run them more efficiently.

Take advantage of Mouse mobility to skip through paragraphs, highlight sentences or entire passages. And initiate commands with a mere point-click.

In addition, much of what you are doing by hand today can be automated through our Mouse Menus. Which translate multiple key commands and mouse moves into a one mouse-click operation.

The Microsoft Mouse even includes a free graphic bonus—PC Paintbrush.™ A color paint program that can live up any paper presentation.

MS-DOS applications from "MS" itself. For running your PC, your life, or your business, everything you need to know is our name.

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# THE ORGANIZING PRINCIPLE

*These days, a desktop organizer is often part of a successful executive's gear. But the similar features these programs offer make finding the right one a very personal choice.*



Most of you out there acquired your PCs to help you find better, more efficient ways of performing your daily business tasks. And while all the software manufacturers claim increased productivity and efficiency, all too few of these products actually belong to that wonderful class of software that performs truly useful tasks in innovative ways. The first spreadsheets did this; they enabled number workers to approach their chores in such an entirely new and efficient fashion that the software actually changed the nature of their jobs and brought with it a sense of excitement.

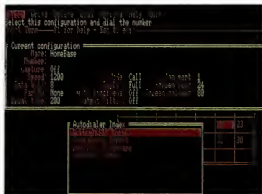
If there's another product category that belongs right up there, it's desktop organizers. These truly useful tools can actually help you to work better and smarter.

The organizers—perhaps better termed “multifunction resident utilities”—are proliferating. The first, and most successful, was Borland's *SideKick* (see “It's About Time: 15 Real-Life Productivity Solutions,” *PC Magazine*, Volume 4 Number 24). Here, we look at two others:

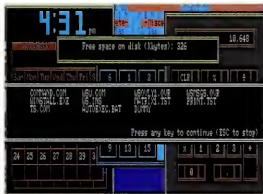
*HomeBase* and *PolyWindows DeskPlus*. By no means, however, do these two complete the list. *PC Magazine* will review other organizers as they come our way.

**WHAT THEY DO** Most organizers provide four basic features—a linear database of some sort (sometimes mimicking the paper Rolodex system), an on-screen calculator, a calendar/appointment book, and an editor. Some add ASCII reference tables for programmers. Others add terminal emulation and background communication. All of these

## ■ TWO DESKTOP ORGANIZERS



When you call HomeBase's modular desktop utilities, they replace the application you are currently in on-screen. Pictured here are the communications and calendar modules.



PolyWindow's DeskPlus lets you call up windowed desktop modules including a calendar, notepad, and various DOS services from within applications programs such as WordStar.

functions are resident in the background and can be called at any time to the foreground for instant operation without disturbing the current application.

The basic functions among the programs are so similar that what matters most in comparing them is not the actual features but the ways in which they implement the procedures. Some use roll-down menus; others, overlay screens. Some are suited only to large-memory machines; others are modularized to enable subsets of features to be loaded when memory is critical. Since the differences lie in form rather than substance, the appropriate choice of an organizer is a personal one.

**HOMEBASE** Amber Systems' *HomeBase* is a remarkable piece of software at the remarkable price of \$49. This product is the brainchild of a group of marketers and coders who got their start at Borland International, and the company's legacy is highly evident. *HomeBase*, however, is so elegant that it has one up on *SideKick*. One way to look at it is to say that Borland's product is a first-generation organizer, while Amber's is second or third generation. It delivers the most bang for the buck among desktop organizers.

*HomeBase* will run on a 256K machine with a couple of floppy drives, but it's really designed for big memory (512K and above) hard-drive computers. That makes sense in view of its extensive DOS services

and the fact that it occupies 175 to 178K when resident in memory (and, to be really useful, that's all the time).

Installation of *HomeBase* is a snap. Its own installation program not only transfers *HomeBase* program elements and files from the unprotected distribution disk, but also edits existing CONFIG.SYS and AUTOEXEC.BAT files to include *HomeBase*-related instructions. It works with virtually every available program, though *XyWrite* and *SmartComm II* are two exceptions. *HomeBase* works fine with *ProKey* or *SuperKey*. You must take care to stack the various elements correctly in AUTOEXEC.BAT.

Once installed, *HomeBase* is present to be called while just about any other program is active or to perform communications tasks quietly in the background while other programs are working.

Primary *HomeBase* functions include DOS services, linear database services, editor/word processor, calendar/appointment book, terminal communications, calculator, and cut-and-paste operations.

The key combination Alt-Shift-H brings up *HomeBase*'s main menu, which lists major options:

- Calculator (Alt/Shift/=)
- Calendar (Alt/Shift/C)
- DOS Services (Alt/Shift/D)
- Notebase (Alt/Shift/N)
- Quick-Term (Alt/Shift/Q)
- Cut (Alt/Shift/K)

You can select the desired function using a smart cursor or by pressing the indicated key combinations. Minihelp is displayed at all times on the prompt line, and textual, context-sensitive help is always available by pressing F1.

**CALCULATOR** The "scientific-type" calculator has 26 memory variables, a "tape" that can be saved or pasted into other work, and a feature that enables you to cut a column or row of numbers from any other program screen and move them into the processing area. Math can be done in decimal floating point or hex. Conversions are instantaneous.

**CALENDAR** Any number of calendars can be maintained simultaneously so that an office secretary, for example, can keep



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### FACT FILE



**HomeBase**  
Amber Systems  
1171 S. Saratoga  
Sunnyvale Rd.  
San Jose, CA 95129  
(408) 996-1883

Price: \$49 (not copy protected)

Requires: 256K RAM, dual floppy drives, modem.

CIRCLE 118 ON READER SERVICE CARD



## ■ TWO DESKTOP ORGANIZERS

separate appointment calendars for everyone in his or her operation. A query facility enables you to respond to such questions as: "When did Joe, Paul, and Mary have lunch together?" or "Give me a list of any time anyone in the office had a meeting with Customer Jones," or "Total my expenses for the day (week, month, year, period) and move them over to the word processor so I can write an excuse for the boss."

The daily calendar view divides the screen into two sections: appointments for the day and to-do today. Appointments can be annotated to any length, and the to-do list can roll forward to tomorrow (or any other future date) those items that you just didn't quite finish today.

A weekly view shows a week's worth of days, each with a column of highlighted hours representing appointments. Cursor up, down, left, right, and PgUp and PgDn keys are used extensively to zoom in and out of the various calendar levels.

In fact, all menus are reminiscent of Lotus's 1-2-3 or Microsoft's Multiplan; a list of all possible selections appears at the top of the screen with the default selection highlighted. You can tab across the list highlighting and entering the options in turn, or you can simply hit the first letter of the desired selection.

**DOS SERVICES** The DOS services facility opens up with a single window and a list of functions. These enable you to view up to four different directories simultaneously and to mark files for copy, erase, or move operations. Additionally, you can make and remove subdirectories, rename files, view files in a display mode, or edit files with the *HomeBase* internal editor. (Editor commands use the *WordStar* control format.)

Subgroups of files can be selected (sorted) by pattern (\*.\*), name, extension, or date. Files can be manipulated one at a time or in groups. In either case all operations are visible to you. This, I believe, is the shell that DOS should have had originally.

**DATABASE SERVICES** *HomeBase's* database services are very powerful, enabling you to maintain Rolodex-type files, index card records, message records, or, in

fact, any form you wish to create. (Included in the *HomeBase* package is a form template maker and report writer used with the system's linear database system.) There is no software limit on the number of databases that can be maintained. *HomeBase* even has a mini query language for instantaneous retrieval of data through field comparison.

**TERMINAL SERVICES** *HomeBase* includes a smart terminal package that allows uploading and downloading (start/stop or Xmodem) and fully automatic operation. It also functions as an autodialer for voice communications.

In the autoanswer mode, *HomeBase's* terminal can function entirely in the back-

### ■ Each of *HomeBase's* services could make it in the marketplace as a full-featured standalone product.

ground while you work on something else.

For example, suppose you are working in 1-2-3 when a call comes into the computer—your partner with a file to upload. *HomeBase* will answer the call and notify you (in the 1-2-3 screen) that it has done so. Your partner can upload his file while you stay in 1-2-3, or you can duck out of the spreadsheet, communicate with the caller, and then return to the spreadsheet without dropping a character.

**OVERVIEW** This is one of those rare software offerings that you have to see to believe. Each of *HomeBase's* services—editor, database, calendar, calculator, and terminal—could make it in the marketplace as a full-featured standalone product with price tags over \$49.

However, these packages don't stand alone. They reside in memory, work synergistically, and are available for immediate call no matter what you're working on at the top level.

*HomeBase* is written in C and assembly language. Its source code has over 100,000 lines—an obviously expensive effort in a highly competitive field.

Don't be deterred by *HomeBase's* modest price. This package would be a bargain at twice the cost.

**POLYWINDOWS DESKPLUS** Polytron Corp. has taken a unique approach to the development of desk organizer software—a modular strategy that affords you maximum flexibility in choice of services.

The basic Polytron product is called *PolyWindows DeskPlus*. It provides a DOS shell, text editor, calculator, database services, calendar/appointment books, autodialer, cut and paste, keyboard macros, screen saver, and an ASCII table. Typically, *PolyWindows* uses about 70K bytes of RAM, so it is barely functional in a 256K machine, but it really shines in a beefier RAM environment.

Unique in the Polytron approach is that each of these services (and several others in development) comes as a module that is loaded into memory (at your option) through a .BAT file. This system enables you to create several different resident programs and to load the one you want at the beginning of a computer session, thus reserving a maximum of memory for the tasks at hand.

Having separate modules also allows Polytron to be a bit more extravagant with code size in each module. The larger code size makes *PolyWindows* graphics displays fancier than most in this class of software, and the functions themselves are more complete.

**FACT FILE**



**PolyWindows DeskPlus**  
Polytron Corp.  
P.O. Box 787  
Hillsboro, OR 97123  
(800) 547-4000  
Price: Copy protected,  
\$49.95; not copy  
protected, \$84.95

Requires: 256K RAM, DOS 2.0 or later,  
one double-sided disk drive.

CIRCLE 88A ON READER SERVICE CARD

## ■ TWO DESKTOP ORGANIZERS

The modules fit into a command shell that is highly intuitive and makes extensive use of roll-down menus and context-sensitive help. You can also change window colors and window sizes, and stack windows as desired.

**RESIDENT TEXT EDITOR** The *PolyWindows DeskPlus* resident editor is a good example. Far from being merely a notepad, this resident editor is a full-blown word processor that can handle a 64K-byte text file (about 42 typewritten pages). The text editor can display up to 16 windows simultaneously, representing 16 different files or 16 views of a single file.

All customary word processor control features are present, including block moves, undelete, file merge, word wrap, and global searches and changes. Context-sensitive help is available at all times, and most complex features are selected from pull-down menus.

**CALCULATORS** *PolyWindows DeskPlus* has not one but three calculators. It's up to you to insert the one you want to use in the start-up batch file.

The standard general-purpose calculator presents a graphic image of a pocket calculator on the screen with a clear representation of corresponding keys on the PC (or AT) keyboard. A "tape" is available to keep track of operations, and any answers can be moved to other work inside (or outside) of *PolyWindows*. This calculator handles addition, subtraction, multiplication, division, and percentage computations. You can choose fixed or floating point.

A "small" calculator can be installed optionally. This features a smaller graphic display so that you can see more of the work being overlaid.

Finally, a programmer's calculator is available that operates in any of four number bases—decimal, binary, octal, and

hexadecimal. The ASCII symbol for the result is displayed, as well as the mnemonic name for the first 32 values.

**DATABASE SERVICES** The *PolyWindows* database services are called an "electronic Rolodex." The name is apt enough in that each data entry form looks like a Rolodex card on top of a stack. The tabs of previous cards with their alphabetized entries are always visible, since *PolyWindows* automatically maintains their organization and sorted order.

Up to 16 "decks" of cards can be maintained simultaneously. Cards can contain a single line or an entire screen. You can print a single card or an entire deck.

**CALENDAR/APPOINTMENT BOOK** The calendar/appointment book divides the screen in half—the left side for the time/calendar functions, the right side for the 8 a.m. to 8 p.m. appointment book.

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## ■ TWO DESKTOP ORGANIZERS

The appointment book features an "alarm clock system" that calls you from any outside operation by overlaying a message on your current work area. Pressing Esc gets rid of the message. And if you really are a time nut, the alarm clock will chime in each new hour for you.

You can have a number of appointment books—one for each person in the office, for example, so that appointments and trips can be scheduled from a central point.

**AUTODIALER** The *PolyWindows* autodialer is designed to run with a Hayes-compatible modem. It dials local and long-distance numbers (from the electronic Rolodex) or a number that appears in any document. Alternatively, you can simply type the number to be dialed.

**CUT-AND-PASTE** The *PolyWindows* cut-and-paste facility is called The Grabber. Like that of similar systems, it enables you to import and export data between your current programs and between the *PolyWindows* features.

**KEYBOARD MACROS** PolyKey is the program's resident keyboard macro facility. Like other Polytron modules, PolyKey is as powerful as some standalone software products that offer similar services.

PolyKey enables you create up to 16 different keyboard sets, each of which can redefine up to 60 keys that could represent up to 2,500 keystrokes.

The macro sets can be loaded into memory and then selected from pull-down menus. When one set is selected, it overrides any set in use.

**DOS SHELL** The *PolyWindows* DOS shell uses pull-down menus to ease seven DOS functions—change directory, make a new directory, check disk space, erase a file, list files, read a file, and rename a file. This is one of the few areas where *PolyWindows* seems to fall a bit short of the competition, but keep in mind that *PolyWindows* is really designed for semi-professional computer users who probably know their way around DOS anyway.

**ADD-ON FEATURES** I mentioned at the beginning that *PolyWindows* is unique in its modular growth concept. At present,

the list of add-on tools includes The Archivist, The Cryptographer, PolyWindows Talk, and PolyWindows Debugger.

The Archivist is a memory-resident document storage and retrieval system with data security and data compression facilities. Once files are compressed and stored in volumes (one volume per floppy, 250 files per volume), files can be recalled by keyword, date range, document name, or original disk filename. The system includes password protection (by volume).

The Cryptographer can encode any kind of file, including a text file, a spreadsheet, or a database, making it unreadable to anyone who doesn't know the password. Each file can have its own password.

PolyWindows Talk is a resident communications package with VT100 terminal emulation and script operation similar to *CrossTalk*. It supports start/stop or Xmodem file transfer protocols. It can function automatically in the background while you are using another program or can be used as a standalone communications package.

PolyWindows Debugger is an advanced programming tool that can be called at any time to analyze a program running in the foreground. It can single-step through a program while displaying code in binary, hex, or assembly language. In fact, it disassembles as the program runs so you can see exactly what's going on. You can set multiple break points and perform hex arithmetic and block moves.

The Archivist costs \$49.95; The Cryptographer, \$49.95. PolyWindows Talk runs to \$79, and PolyWindows Debugger weighs in at \$99.

**CONCLUSION** Overall, because of its modular construction and modular approach to the market, *PolyWindows* is a very different system from either *HomeBase* or *SideKick*. Although *HomeBase* left behind hooks in its code for "possible add-ons," *PolyWindows* is designed to be added to as the product line matures. Both are easy to use; the differences are so subjective that your ultimate choice of product is a personal one. ■

Richard Aarons is a contributing editor of PC Magazine and a senior editor at Business and Commercial Aviation magazine.

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## Project Management Software:

# THE TOP SELLERS

It's February 11. Do you know where your project is? If you don't know the answer, don't be too hard on yourself; you're not alone. Typically, none of us has the time in our busy schedules to stay on top of every detail in a complex project. Unfortunately, though, these details add up to whether or not your project gets completed on time. And when you are responsible for meeting that deadline, you had better know just what pieces could derail the project schedule and result in your reassignment as branch manager of the Timbuktu office.

Most people don't manage project schedules simply because it takes so much time. Once you map out all the tasks, you still have to figure out the schedules and calculate which tasks must be completed on schedule and which can slide. Then comes the task of presenting all this information (usually with 3 by 5 cards taped to a wall) so that you can see how it all fits together. Of course, you have to go through the same procedure when you need to make a midstream adjustment when you get behind (or perhaps even ahead of) schedule.

As you are probably aware, your PC stands ready and waiting to take over much of the drudge work involved in managing a complex project. Project management software can help you keep your different tasks in order, produce Gantt and PERT charts to guide you through the project, and even make sure that



*Managing a complex project means staying on top of all those niggling details with the right scheduling and graphic tools.*

you don't schedule one person to work 16 hours a day (unless, of course, you want to). The program takes over the jobs of keeping the lists of tasks and calculating all the dates and workloads, leaving you to see that the schedule is met.

These programs make project management easier, but they still don't make it easy. You must plan out the different elements thoroughly and keep your expectations realistic. If you use the program to track performance against the schedule, you must take the time to enter the data as the project progresses. Like most computer applications, the savings come with the speed of the calculations and the ease of making revisions. Many of the packages reviewed here even let you save a typical project and then modify it for a specific set of circumstances.

**SIX SCHEDULERS** PC Magazine decided to take a look at a half dozen of the more popular, best-selling project management programs. In each brief review, we present some of the highlights that set one product off from its competition, either for better or worse. They are presented here in ascending order by list price, not necessarily in ascending order of value.

As you read the following minireviews, keep in mind that not all programs are suited for the same kinds of projects. Some are best for simpler projects, while others are capable of handling more-complex problems. The right selection depends in large part on what you are trying to track.

**MICROSOFT PROJECT** *Microsoft Project* is the least expensive package in the group and certainly one of the best bargains. While it is not as sophisticated as some of the others, it has the strength to do what must be done in most cases. You enter the tasks at the bottom of a Gantt chart display, and you can specify up to eight different resources per task. If a resource is overextended for a given time period in the plan, the program will let you know. You may then choose the Autoschedule command, which will quickly "smooth" any resource and adjust the task schedule accordingly. *Project* goes one step further with resource tracking by offering a report that prints a page for each resource category, listing the different tasks and their scheduled start and end dates. This is a handy format because you can hand the pages out to the individuals responsible for each resource and it spells out all they need to know about the project schedule.

You are limited to a mere 128 tasks per project, so you should not choose this program for your next interstate highway bridge project. You can incorporate other projects as tasks within a project, but each is treated as a single task, and no information is carried over about the resource requirements. On the other hand, if you are dealing with projects that have similar, repetitive tasks, you can create a template plan and reuse it as often as you need.

Not surprisingly, *Project* comes with all the Microsoft earmarks we have grown to expect, from its clear plastic slipcase that doubles as a bookstand to the *Multiplan* menu structure. As with the other Microsoft products, you use the Tab key or Space bar to highlight menu options and

## EVALUATING THE SOFTWARE

*PC Magazine's reviewers tested each of the packages reviewed here by duplicating real-life situations.*

To test each package, we first ran through the tutorial and the manual to become familiar with the program's approach to project management. We then entered a simple, 35-task project that simulates the opening of a branch store. We tried to use that first project as a template to create a second, similar project scheduled to start 1 month later and schedule the two projects side by side. We chose this approach because we believe it is most similar to the way people would use the software; you develop a generic project that you can quickly call up and modify. From here, you enter new information and can quickly see

what effect it has on workloads and deadlines. We looked at how well the program handled the sample task. How easy was data entry? Did the program have a way to "smooth" overextended tasks, or did we have to do that manually? How quickly and easily did the program respond to changes, and what charts and tables would it create? Could you get separate listings of tasks for individual resources, so that you could give project members a list of their tasks and deadlines? We also kept an eye out for special features that might set a program apart from the others.

—Alfred Poor and Bruce Brown

the Tab key to move within fields on option screens. It even supports the Microsoft Mouse if you are suffering from "Mac-Envy."

The manual and tutorial are clear and well organized. The tutorial is a series of lessons in the manual that use sample files included on the program disk. The manual has a reference section, a thorough index, and some helpful information about project planning and the accounting conventions used in the calculations.

A few of the other nice features include the ability to sort the tasks in a variety of ways, such as by critical path and by start or end date. I found the sort by late start date to be the most attractive and useful feature. Another nice surprise was that the Gantt chart printed sideways automatically (using an Epson FX-85), rather than creating a two- or three-page report that is much more difficult to read and use. It also has numerous options for exporting data to other programs.

*Project* is not without its shortcomings. It has no network diagram. It cannot accept tasks that last for fractional time periods or resource requirements to the hundredth of a unit (it does accept tenths). It does not track projects through various stages of partial completion; you would have to

modify the plan to reflect the current situation and would lose the details of the original schedule.

Like most of the other programs reviewed here, *Project* is copy protected. It does have a procedure that permits you to install the program on a hard disk and run it without the floppy key disk. Unfortunately, there is no uninstall procedure, so that you cannot take it off your hard disk when you want. If your hard disk should fail, you have lost your installed version. True, you can then revert to using the key disk, but that seems to be an unnecessary hassle.

Overall, *Project* is a great place to start. It isn't as powerful as some of the competition, but then again, it may be all that you need. It is available at a price that lets you get involved in serious project management at a low cost, without risking too much in case it turns out that project management is not for you.

**COMPUTER ASSOCIATES' SUPER-PROJECT** Computer Associates' Micro Products Division is the new name for Sorcim/US, a company that is well known for its *Super* family of products, including *SuperCalc3*. *SuperProject* is its standard bearer in the project manager market.

Unlike most of the programs we re-



### FACT FILE



**Microsoft Project,  
Version 1.02**  
 Microsoft Corp.  
 10700 Northway Way  
 Bellevue, WA 98009  
 (206) 828-8280  
 List Price: \$250  
 Requires: 128K  
 RAM, one doubled-  
 sided disk drive.

CIRCLE 666 ON READER SERVICE CARD

viewed, with *SuperProject* you define a project by placing tasks on a network chart instead of filling in a table or a Gantt chart. You create a task and specify its duration and required resource, and then you define the links between the different tasks. Note that you can only specify one resource per task on the network display; this is the "lead resource," but you may specify as many secondary resources as you wish on a separate table.

All of *SuperProject*'s functions can be accessed in either of two ways. The first causes pull-down submenus to appear from the top-row commands on the screen. Select the appropriate choice, and the command is executed. You can also bypass the menu process entirely, using function keys and Ctrl or Alt key combinations.

After you have defined your tasks, you can adjust the layout by moving them around the screen, either singly or in groups. *SuperProject* calculates the critical path based on the links you establish, and you can view it on either the network or Gantt displays. While it is nice to have the artistic control of being able to place the tasks where you wish, this undertaking is time-consuming. Some of the automatic drawing routines of the other programs do a better job of placing the tasks.

One of the nicest aspects of this program is the high level of customization built into the system. There is an entire screenful of "preference" settings, cover-

■ **SuperProject**  
deserves special mention  
because it is not copy  
protected. There's no  
special installation  
procedure—just copy the  
files and go.

ing everything from the type of monitor and the units of time measurement to the timing of the automatic save feature that saves your work to disk at fixed time intervals while you are working.

Computer Associates has given you a choice other than the traditional tutorial in the manual (14 lessons), which covers nearly every aspect of the *SuperProject* program. For the more adventurous or those with some experience with project management software, there's the "10 Minutes to *SuperProject*" booklet. This is a 22-page pamphlet that exposes you to the program's basic operations to get you off to a fast start.

The program deserves special mention

because it is one of the two packages reviewed here that is *not* copy protected. There's no key disk, no special installation procedures—just copy the files and go.

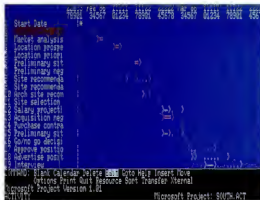
The package includes the printer utility *Sideways*. *Sideways* permits you to print tables and graphics running down the long dimension of the page, thus creating tables that are two or more times wider than standard printing can produce. While this appears to be a bonus, it has a major shortcoming. You must create your report with *SuperProject* and save it to disk, then leave the program, call up *Sideways*, and then (finally) print the report. You must return to the original program to continue work. To top it off, you must tell both *Sideways* and *SuperProject* about your printer in separate configuration procedures. If they are going to package the programs togeth-


**FACT FILE**



**SuperProject, Version 1.10**  
Computer Associates  
Micro Products Div.  
2195 Fortune Dr.  
San Jose, CA 95131  
(408) 942-1727  
List Price: \$395  
Requires: 256K RAM,  
DOS 2.0 or later.

CIRCLE 864 ON READER SERVICE CARD



The Microsoft Project Gantt display is straightforward, showing the critical path.

Preferences

Preferences Commands Projects Print Help

Beep: On Off    Alarm: Long Short  
Blinking: On Off    Sound: On Off  
Confirm Quit: Yes No  
Confirm Blank: Yes No  
Confirm Julets: Yes No  
Auto Format: 11-12-85 12:11:05 12Nov 85  
Date Separator: / - blank  
Screens: Monochrome Color 3M graphics  
Remedy: Holdover Toggle  
Actual: Before On Gantt: Yes No  
Highlight: Monochrome On Gantt: Yes No  
Allow Date Entry: Yes No

Save After: 5 Minutes  
Save After: 5 Minutes of Inactivity  
Save Screen After: 5 Min. Inactive

Allocate By: Single Mouse Percent  
Alert Level: 0    Allocation: 0  
Times Up: Yes No    Priority: 50  
Billable Hours: 8.00  
Rate: 25.00    Fixed Costs: 0  
Delete: Display Screen: Yes No  
Auto Create Screen: On Off  
Auto Positioning: On Off  
Duration: 5    Auto Pasting: On Off

Project Profile:  
Project Suffix: g

Transfer: SC2/SC3 SC3-MS2 CPU Printer  
Printer Paper Width 100-250: 00  
Print: Printer Spool Printer Disk File

SCRL

Using *SuperProject*'s preference screen, you can specify many different details to customize the program to your personal tastes.



# Introducing Po

Microsoft® Windows has arrived.

For anyone who uses a computer in earnest, that is extremely good news.

Windows gives you a practical way to integrate programs. It radically decreases the time it takes to move from one application to another. Dramatically simplifies the means of consolidating data from many different programs.

And as a graphical extension of the MS-DOS® operating system, it gives you a highly visual way to work and to organize your work.

In short, Windows brings efficiency to all those processes of personal computing which have till now been awkward, unwieldy, inconvenient.

## The joys of job hopping.

With the advent of Windows, you can work with multiple applications. And switch from program to program with ease.

Start up with one application, then another, and another. Leap back and forth between applications as your work routine dictates. Then pick up right where you left off.

The ability of Windows to change quickly from program to program logically and naturally magnifies the utility and productivity of the personal computer. And is a recognition of the way people who exploit the power of PCs really do their jobs.

## Breaking the 640K barrier.

Just like you, Microsoft Windows can handle several projects at the same time. Juggle assignments. Deal with frequent interruptions.

And Windows will ignore the 640K limit of the PC, especially if you have a hard disk, the Intel® Above™ Board, or expanded memory. It will execute the rather neat trick of working with more programs than

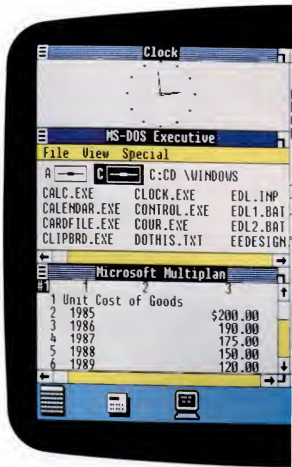
memory can hold at one time.

## Spreading knowledge.

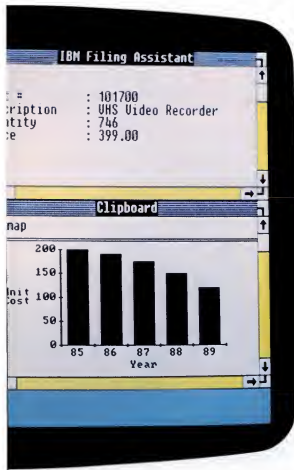
Another significant service Windows performs is accelerating the movement of information from one program to another.

Collecting and combining that information is as simple as taking a "snapshot" of data in one program. Editing it. Then consolidating it with data from other programs.

With Windows, you can enjoy the advantages of conventional integrated programs without their compromises. Because Windows lets you put together the applications that you know, and that get a job



# Power Windows.



done for you.

Choose your best word processor, spreadsheet, database—you name it. They're all there for you at a keystroke.

## Common ground.

Finally, Windows is not only an immensely powerful tool for today, it's also a solid base for a new generation of Windows Applications.

As an introductory offer, two of these—Microsoft Windows Write and Windows Paint—are included in the Windows package. Along with more than a dozen other Windows desktop applications. Including a DOS file management program, calendar,

cardfile, notepad, calculator, and a telecommunications program.

In Windows Applications you have a common interface which includes drop-down menus, dialog boxes, icons. Along with a richer environment that allows you to mix pictures and text. And to summon different type faces and styles at a keystroke.

Windows is a bridge between today's applications and the graphics based software now evolving. A way to work interchangeably with today's programs. And tomorrow's.

**Of course, all this is going to cost you: \$99.**

A price that makes Windows the most startling value ever offered in software. A comparable collection of programs—a switching program, a graphic interface, desktop applications, a word processor, a drawing program—could easily cost hundreds of dollars more.

If you're someone who uses personal computing as a natural part of your work life, who capitalizes on the productive powers of sophisticated applications, look into Windows.

It offers a new vision of what a computer can do.

## Microsoft Windows

The High Performance Software™

For the name of your nearest Microsoft dealer, call (800) 424-9400. In Washington State and Alaska, (206) 838-8088. In Canada, call (800) 387-6636.

Note: Photo shows color and resolution obtained on an IBM® PC equipped with IBM Enhanced Graphics Adapter Monochrome display is generated when an IBM Color Graphics Adapter or compatible graphics adapter card is used.

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## ■ PROJECT MANAGEMENT SOFTWARE

er, the least they could do is make them work together a little.

*SuperProject* has high capacities in most areas, but in the case of resources, this is of less use than with other programs. It cannot automatically smooth resource conflicts caused by overscheduling a given resource. It will notify you when such a conflict exists, but you must adjust the start dates of the tasks involved by hand. You can also bring in a second project as required by our test sample, but you need to do a fair amount of editing and adjusting before you can schedule the two projects side by side. Without automatic resource leveling, there is not all that much point in combining the two projects anyway.

In balance, *SuperProject* is a functional product that does not stand out particularly. It has power and flexibility, but this is offset by some awkward procedures and its limitations.

### SOFTWARE PUBLISHING'S HARVARD TOTAL PROJECT MANAGER

What's in a name? *Harvard Total Project Manager* (HTPM) evokes images of somber-suited MBAs strolling through an ivy-draped New England campus. As it turns out, the program is now sold and supported by Software Publishing in California—the PFS people.

*Harvard Project Manager* was one of the first hits in the micro project management software market. This product is the advanced version (hence the "Total" in the title), adding features beyond the origi-

nal. *HTPM* has a number of features that set it apart from the others, but not all of the differences are advantages.

The program can use a Microsoft Mouse and has a DIF-format export procedure to transfer your project data to your spreadsheet of choice. It includes numerous views of your project, including Gantt, network, and specific details for individual resources. It can be used to manage projects as well as plan them; you can track the predicted schedule against actual performance.

*HTPM* shines when it comes to report options. You can specify a range of dates for inclusion in the report and enter your own header and footer text. In many cases, you can select an individual resource (or range of resources) to be listed in the report. You can also control the order in which the tasks are presented, specifying up to two sort fields for a report. Provided that your dot matrix printer is supported, *HTPM* even gives you the option of printing your reports sideways on the page.

The manual and slipcase are bound in handsome crimson leather (after all, it is named for Harvard) with gilt-embossed lettering. There is plenty of content, neatly presented in a classic type font. Unfortunately, the information is not that well organized and is saved only by a thorough index. The biggest problem is the poor quality of the screen shots; many are blurred to the point of illegibility.

The task entry is done through the network display, which means that you de-

sign the network as you go. Only after you create a task box do you enter the detailed information. This tends to be a bit slower than some of the other programs. *HTPM* is unusual in that whenever your network path branches, you must create a milestone task, which is a task with no duration. While these milestones may add clarity to your project plan, they also add to the effort of building a project.

The program can load multiple projects, such as the two store openings in our test problem and can report on the resource requirements across multiple projects. It can even identify resource conflicts, but that is as far as it goes. It will not level resource requirements, so you have to go through and adjust the schedule manually until the problems are resolved. There is a 200-task limit for each project, which would be constricting were it not for the ability to combine projects.

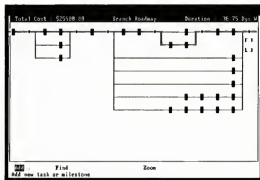


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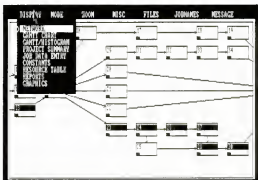


**Harvard Total Project Manager, Version 1.0B**  
 Software Publishing Corp.  
 1901 Landings Dr.  
 Mountain View, CA 94043  
 (415) 962-8910  
 List Price: \$495  
 Requires: 384K RAM,  
 DOS 2.0 or later.

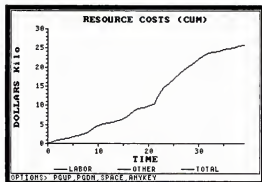
CIRCLE 665 ON READER SERVICE CARD



With the *Harvard Total Project Manager's* zoom feature, you can see the shape of the whole project at a glance.



This is the *Project Scheduler Network* main screen, showing the network and a pull-down menu of the different display options available.



Project Scheduler Network has a graphing capability beyond simple histograms. This shows the projected cumulative costs of the project.

HTPM is copy protected, which is a flaw offset by the fact that you may install it to run on a hard disk without the key disk. Like *Microsoft Project*, this install procedure has no uninstall option, so, ultimately, it's an inconvenience.

The tutorial is thorough but is not interactive. You essentially watch information presented on the screen. There are no exercises in the manual to work through, so the most-effective mode of learning seems to be jumping into your project and relying on the manual's index to steer you toward the help you need.

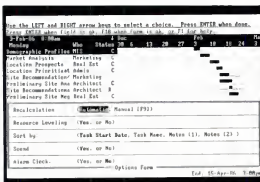
Overall, *HTPM* is a competent, if cumbersome, product. The reports can produce just about any set of information about the project that you might wish. It goes beyond planning to give you project management facilities, but you need to perform resource smoothing and network design by hand, which some other programs will do automatically.

**SCITOR'S PROJECT SCHEDULER NETWORK** In a few years, microcomputers have gone from being home playthings to kingpins in the modern workplace. From where we stand, one of the key factors that have led to this rapid rise to prominence is that these machines are highly flexible tools that can be shaped to perform a variety of tasks. As a result, programs that support this flexibility are more likely to prosper than those that are more restrictive than the others.

Scitor's *Project Scheduler Network* incorporates a feature that could be described as gimmicky; it is designed to be run with a mouse. Although you can run the program without one—there is an undocumented keyboard driver that allows you to do so—the company appears to keep this a secret. This mouse feature has been given such priority that it makes the overall product unnecessarily restrictive.

In any case, the bulk of the data entry requires keyboard commands and entry, and the remainder could just as easily have been handled by cursor movement keys. As a result, the program's hardware restrictions come across as supporting a gimmick that has no concrete justification.

If you have a system configured to meet these requirements, other merits of the program are worth examining. One of the program's greatest strengths lies in its reporting features. Since you are able to record the initial project schedule as well as the actual performance, you can produce a host of reports comparing the projected and actual schedules and costs. You can request reports organized by resource or task. Most reports also have a parameter screen, on which you can narrow down the data to be reported, such as just critical tasks or noncritical tasks or tasks falling within a certain range of dates. In this way, the half-dozen report formats serve multiple purposes. *Project Scheduler Network* also has a series of histogram, bar, and line graphs that show resource and cash re-




One of *Timeline's* major strengths is that it lets you select options to tailor the program to your needs.

quirements for the project. Both reports and graphs can be routed to either a printer or the screen. Many plotters are also supported for the graphs as well.


Tasks are numbered by groups, in a technique called "work breakdown structure." The program can group tasks with similar numbers together to report resources and schedules for the project by larger phases, to give a broader picture than simply by individual tasks.

On the down side, data entry can be a chore using this package. While it is true that the mouse can make it easier to place the tasks on the network diagram, you must switch to another screen to define each task's parameters, and to yet another to define resource requirements. The



**FACT FILE**

**Project Scheduler Network, Version 1.1**  
Scitor Corp.  
250 Lincoln Centre Dr.  
Foster City, CA 94404  
(415) 570-7700  
List Price: \$495  
Requires: 320K RAM;



DOS 2.0 or later; IBM color/graphics or enhanced graphics board or Hercules monochrome graphics board; Mouse Systems or Microsoft mouse (before Version 4.0).

CIRCLE 662 ON READER SERVICE CARD

## ■ PROJECT MANAGEMENT SOFTWARE

mouse is not involved in these screen switches, and the jumping back and forth slows down the data-entry process. Since the critical path is recalculated each time that you change the network diagram and a lag occurs even with a small project, the delay could become significant with a big job. In addition, because you have to design the network yourself, the layout will be as clean or tangled as your skills permit; it might be better to have the program do it for you.

The program not only will not level resource conflicts automatically, it won't even notify you that a resource conflict exists. As a result, you must scan histograms for each resource to find out where they are in conflict (if at all) and then manually adjust the schedule.

If the program did something outstanding compared with its competition, its restrictive hardware requirements and shortcomings could be overlooked. Its reports and graphs are not reason enough, howev-

er, and you will probably find one of the other programs to be more useful.

**BREAKTHROUGH SOFTWARE'S TIMELINE** Can a late entry into a software market make a dent in the lead of the established programs? 1-2-3 didn't let *VisiCalc* scare it away, and *WordPerfect* was not the result of people deciding that *WordStar* had the market sewn up. Breakthrough Software's *Timeline* may not be in the same league as 1-2-3 or *WordPerfect*, but then again, it might.

Certain parts of the program are a bit rough around the edges. The network diagrams are spartan and functional—strictly short on flashy graphics. The program does not have a sideways printing mode but instead explains how to create a print file for use with a utility that you might own that can print sideways. On the print-out of the Gantt chart, you must rely on a C in a lefthand column to tell which tasks are on the critical path. None of these flaws are

fatal, although they can be annoying.

Other features of *Timeline* make these few shortcomings more forgivable. At the top of the list comes the ease of task entry. You work from a Gantt chart display and call up a task form by adding a new task or editing an existing one. In addition to the standard task name, duration, and resource assignments, you can enter up to two lines of notes to code tasks for reporting purposes and to record comments. You are not limited simply to days in the duration and assignment of resources. If you choose, you can plan your project requirements in terms of minutes.

After you have defined the tasks, dependencies are easy; just point to the predecessor, point to the successor, and link, all on the Gantt display. You can also turn off the automatic recalculation of the critical path, and the program will prompt you when the project needs to be recalculated. Unlike any of the other programs here, you may define a dependency with either an

### Project Management Software at a Glance

Product name Manufacturer	List price	Copy protected	Memory required	Memory recommended	Hard disk required/recommended	Listed for 640K	No. of tasks per project	No. of resources per project	No. of resources per task	Schedule units	Max. calendar length
<i>SuperProject, Version 1.10</i> Computer Associates Mitre Products Div.	\$395	No	256K	256K	No/No	Yes	1,800	180	5	Hour/day/ week/month	170 years
<i>Harvard Total Project Manager, Version 1.0B</i> Software Publishing Corp.	\$495	Yes	384K	Up to 480K	No/Yes	No	Approx. 200	100	100	Minute/hour day/week/ month/year	Approx. 50 years
<i>Timeline, Version 2.0</i> Breakthrough Software Corp.	\$495	No	256K	384K	No/No	Yes	800	Unlimited	12	Minute/hour day/week/ month	20 years
<i>Project Manager Workbench</i> Version 2.10 Applied Business Technology Corp.	\$1,150	No	384K	512K	No/No	Yes	540 in memory, unlimited w/auto spillover to virtual memory on disk	200	6	Hour/day/ week/month	Unlimited
<i>Project Scheduler Network, Version 1.1</i> Seltzer Corp.	\$495	Yes	320K	Varies	No/No	Yes	2,000	99	500	Hundredth of a day/ day/week/ month	10,000 time periods
<i>Microsoft Project, Version 1.82</i> Microsoft Corp.	\$250	Yes	128K	128K	No/No	No	128	64	8	Day/week/ month	Unlimited

overlap or a lag. In other words, you may define a task as starting 2 days before the completion of its dependent task, and another that must wait for a day after its dependent is complete. You may schedule tasks either ASAP (as soon as possible) if you know the start date and want the earliest possible finish or ALAP (as late as possible)

date when you sign on and then runs through your project asking whether tasks scheduled for completion are in fact finished and whether tasks that should be started have been started. This makes updating your schedule considerably faster.

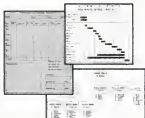
There is much more to like about *Timeline*. The reports may be "filtered" for different factors, so you have near total control over the contents. (You can even embed page break instructions in the notes fields.) All reports are time and date stamped to limit confusion. There is an "undo" command that lets you play "what if" with your project as much as you'd like. There are easy export facilities for spreadsheets and dBASE (full system data and not just the Gantt chart data), two tutorial levels, and, perhaps, the best manual of the group in terms of clarity and content.

*Timeline* is not flashy in its presentation, but for a serious and useful tool for planning and managing complex tasks, it is tough to do better at any price.

**APPLIED BUSINESS TECHNOLOGY'S PROJECT MANAGER WORKBENCH** Here is a product that costs more than four-and-a-half times as much as the least expensive program we reviewed. With that large a price spread, one should expect significant differences. Applied Business Technology's *Project Manager Workbench (PMW)*, Version 2.10 (the advanced version), does add some features, but the big question is whether or not the cost/performance ratio can justify the price.

*PMW* is a polished program that is designed to be easy to learn and easy to use. It relies on I-2-3-like menus across the top of

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## EDITOR'S CHOICE

*Although you won't go too far wrong with any of these programs—all will get the job done to varying degrees—the product of choice is Timeline. It gives you automatic network diagrams, resource leveling, easy data entry, and total control over your report contents. Add to this the ease of playing "what if," archiving of earlier versions, and complete data export functions. It provides a full complement of features without cluttering up the system with frills, and the result is a reasonably priced package that is hard to outgrow and is easy to handle. The fact that it is one of the two programs here that are not copy protected is just icing on the cake.*

sible) if you have a target date that must be hit and you want to see what you must do to be certain of making it.

*Timeline* works out the critical path and resource requirements and flags those that are overextended. If you have two resources with similar abilities, you can use the split-screen histogram display to see if you can reassign part of the overload. If you want *Timeline* to resolve the conflict, it will quickly perform a resource leveling by adjusting the schedule, but the display will indicate which tasks have been delayed for want of adequate resources.

This program is a planning and management tool, and you can track actual performance as you go. There is even a feature that automatically archives up to five prior versions of your schedule, so that you can recover earlier drafts. The management feature that is of most help is the "alarm clock." This takes into account the



## FACT FILE



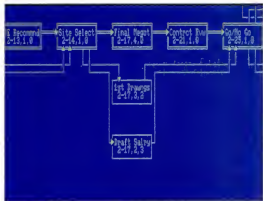
**Timeline, Version 2.0**  
Breakthrough Software Corp.  
505 San Marin Dr.  
Novato, CA 94947  
(415) 898-1919  
List Price: \$495  
Requires: 256K RAM,  
DOS 2.0 or later.

CIRCLE 461 ON READER SERVICE CARD

## ■ PROJECT MANAGEMENT SOFTWARE



Project Management Workbench uses an unusual way to define task interdependencies, resulting in a display that clearly shows the relationships.



This attractive PMW diagram is made even more impressive by the fact that it was generated by the computer, not the operator.

the display, making it quick to move to any portion of the program. Should you tire of menus, however, there is an "expert mode" hidden within the program, just waiting for the right function key and Ctrl combinations to speed you directly from screen to screen. We found the menu approach to be so fast that we were never even tempted by the expert mode, but if you are a power user, this program is ready to keep up.

While most programs have a Gantt chart display and a network display, *PMW* adds a third. You define tasks on the Gantt display, then go to a "dependencies screen" to link the tasks. This is done with

graphics; you point to the predecessor and the successor, and *PMW* draws a line connecting the two. It also calculates the critical path as it goes. The result is a visual chart that maps the critical path and other tasks independent of their durations. The project network can then be generated automatically, and you do not have to bother with each task box's placement on the screen. With very complex projects, the display may not be the easiest to read, but it is far better than one created manually by someone without the skill or patience to optimize the network design.

*PMW* has other attractive features. It prints sideways on many printers, including Epson, for its network displays. Reports may be sent to printer, screen, or disk. Each report may be further defined through the use of various options so that you can limit the data included in the report. There are comprehensive options for unloading data in DIF or fixed-length record formats. There is even a text editor built-in so that you can create memos and letters from within *PMW*; it is truly designed to be the project manager's desktop tool.

The program has a few flaws, however. While it is easy to copy tasks within a project, the dependencies do not get stored. Thus in a case like our sample problem, you must redefine the dependencies for the second project even though the requirements are identical to the first. This can be

solved by storing the original project and then inserting it from the disk as a separate project because this procedure does maintain the dependencies.

The tutorial on-disk is simply an "electronic slideshow"; you sit back and watch it go by. The manual also contains an extensive set of lessons that you can work through, which expose you to most of the program features. The program is copy protected, with no way to install it on a hard disk. You are limited to 45 time periods for the Gantt chart display, but you can schedule projects that last longer than that. You have to adjust the "window" on the schedule by changing the date of the first period displayed, but this can be a bit confusing and is not well explained in the manual.

*PMW* is a strong package that makes strong visual presentations of its data, both on-screen or on paper. It is fast and fairly intuitive to work with, but the bottom line is whether or not its power warrants the additional cost. Most people may well find that one of the less expensive programs will serve just as well. ■

*Alfred Poor and Bruce Brown are consultants with Soft Industries, an independent microcomputer consulting firm in Southington, Connecticut. Bruce Brown is the founder of the Connecticut Computer Society, and has written computer columns for national publications.*




### FACT FILE



**Project Manager Workbench, Version 2.10**  
Applied Business Technology Corp.  
365 Broadway  
New York, NY 10013  
(212) 219-8945  
List Price: \$1,150

**Requires:** 384K RAM, DOS 2.0 or later.  
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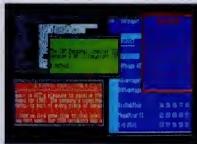
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\*The Bernoulli Box for Macintosh is available in a 5-megabyte single-drive version and a 28-megabyte dual-drive version for AppleTalk.\*

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**BackComm** has a built-in command language called **BackTalk**™ that does for communications what dBase III's built-in language does for databases. The flexibility is unlimited. You can write templates that convert **BackComm** into an electronic mail program, or you can go all out and write a complete com-

munication program with **BackTalk**. Companies can design **BackComm** to fit their specific communication needs with this powerful built-in communication language. And so can VADs and VARs. **BackTalk** will let you simplify the most complex communication procedure—whether it's downloading from a mainframe or sending a Telex.

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**BackComm** uses the universal standard XMODEM protocol, but it doesn't stop there. We have added the powerful and emerging new standard—X-PC. This new protocol allows you virtually error-free transmission or reception with other software using X-PC, as well as other **BackComm** users.

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selling on the other. Imagine—electronic arbitrage! In fact, you can even have up to 8 separate sessions.

## Endless Features

There's not enough room to tell you all the features **BackComm** offers. You can store over 34 million names (DOS permitting) in a tree structured format. You can find any name, phone number, or address with **BackComm**'s built-in search command. You can keep track of the cost of every call on your screen and keep a log of all outgoing and incoming calls. And, without leaving **BackComm**, you can squeeze or unsqueeze files for lower cost transfer or even encrypt them for security.

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Screen color customization capability lets you set the color combinations you want.

Copy, encrypt, squeeze, rename, delete, and view files without disconnecting.

Each screen holds 57 names 6 screens deep.

Built-in communication language lets you automate all your communications functions.

Display date, time, time on line, cost of call, or other prompts at bottom of screens.

BackComm is menu-driven and command-driven.



\*Operating system and disk size dependent

# RCA ENTERS THE E-MAIL FRAY

*RCA Mail for PCs offers a wide range of easy-to-use features and a familiar interface, but its lack of a large user base and a cheap hard copy option may hamper it.*

While electronic mail (popularly known as e-mail) is deservedly called the business communications tool of the eighties, new entries into the market face a long uphill battle. They must compete against established systems that already have large customer bases on which to draw. These services may be succeeding because of a long history in the communications field (such as Western Union's EasyLink) or because of user accessibility and a wide range of services (such as MCI Mail). Any company planning to compete as a public-access e-mail system must therefore be able to offer enough to customers to draw in a substantial user base—after all, an e-mail system is really useless unless those who use it have somebody to send their mail to.



## ■ RCA E-MAIL

```

WELCOME TO RCA MAIL
RCA MAIL is a service mark of RCA Global Communications, Inc.

Your last access was Monday, Nov 18, 1985 2:05 PM EST
Your access today is Monday, Nov 18, 1985 2:13 PM EST

No. Delivered From Subject Lines
1 Nov 15 9:00 TEST.RCA First test message 5

Command? read

Posted: Thu Nov 14, 1985 10:41 AM EST Msg: AGIF-2309-6814
From: TEST.RCA
To: test.rca
Subj: First test message

This is a false message. I am sending this message in order to
test out RCA's new E-mail system. I will first convert this
message into ASCII and then try to send it to myself. Let's see
what strange editorial changes happen then.

Action?
DEC 13: Attention: Move to Switch 1 Capture Vii 1 Nov 00:01:33
  
```

RCA Mail for PCs' opening menu lets you know if there are any new messages to be read on the bulletin board.

RCA Global Communications has thrown its hat into the ring with its new service called RCA Mail for PCs. While the main emphasis of the system is on easy accessibility to telex services, the system now also offers e-mail services, a bulletin board, and an informational database called Hotline.

RCA Mail for PCs is actually only part of that corporation's e-mail system. RCA Mail is an intracompany e-mail system marketed by RCA. By buying access to RCA Mail, large corporations can acquire an on-line network that distributes files, memos, bulletins, and other messages. Each company's system is administered by a single corporate representative who takes people on and off the system, decides on each user's level of access, and watches over the company's on-line bulletin board messages.

However, to accommodate individuals and smaller companies, RCA recently introduced RCA Mail for PCs. According to an RCA representative, RCA Mail for PCs is an exact replica of its corporate cousin, except for two differences: the on-line bulletin board is an RCA-managed, read-only system and the full system is administered by RCA itself rather than a user representative. RCA Mail for PCs was scheduled to

officially come on-line on January 1, 1986; at the time of this writing, it was still officially at the beta-test stage. However, since the system on which it was running is the same as that of the already established corporate e-mail system, it worked for all intents and purposes like a finished product.

**AN MCI-LIKE STRUCTURE** At first glance, RCA seems to have taken a leaf out of MCI's book for its format and commands. RCA Mail, which runs out of the Telenet network, is accessed with an officially registered name and password. You operate the system by responding to a "Command?" prompt with such one-word commands as SCAN, READ, FORWARD, ANSWER, PURGE, COMPOSE, and CHECK. Using these commands in combination with various formulas, you can receive and send e-mail, create letters and save them to a file, and access the bulletin board system.

Many times, your first introduction to an on-line system determines whether that system will be only a test case or become a habit. RCA has done a great deal to welcome new users to its system. It's a great timesaver when you can immediately make full use of a communications system's fa-

cilities without having to puzzle over a list of unfamiliar commands. RCA's documentation features two well-organized pamphlets, a *Basic User Guide* that explains how to sign on, create and read mail, and deal with the filing and bulletin board system and an *Advanced User and Editing Guide*. The latter title is slightly misleading; by "advanced user," RCA seems to mean anyone who has used its service more than once. The manual details commands such as SCAN, READ, UNREAD, and DISPLAY OPTIONS and explains all the text-editing features.

The documentation that accompanies RCA's Hotline service isn't nearly as usable. The pamphlet I received was little more than a promotional brochure; the company representative later sent me an "outdated" leaflet that was much more informative.

RCA Mail also includes a brief, but very well executed, on-line tutorial that



## FACT FILE

**RCA Mail for PCs**  
RCA Global Communications  
60 Broad St.  
New York, NY 10004  
(800) 526-3969 (operator 7)

### Basic E-Mail Charges

- If using local access, business rate (7 a.m. to 6 p.m. weekdays) is \$14 per hour; off-peak rate (6 p.m. to 9 p.m. weekdays and 7 a.m. to 9 p.m. weekends and holidays) is \$7 per hour; night rate (9 p.m. to 7 a.m. daily) is \$4 per hour.

- If using WATS access, business rate is \$18 per hour; off-peak rate is \$14 per hour. Night rate is \$6 per hour.

- For international calls, \$14 per hour plus international access charge.

### Other E-Mail Charges

- Character transmission charge, \$.05 per unit (a unit consists of 1,000 characters transmitted in and out of the system per session).
- Broadcast delivery charge (for messages sent to more than one person), \$.05 per additional addressee.
- Storage charge (for data stored for more than 5 days), \$.007 per day per unit.

### Hotline

- \$.80 per minute for 300 baud
- \$.90 per minute for 1200 baud

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## ■ RCA E-MAIL

can be accessed by typing COMPOSE TRAINER at the command prompt. The tutorial covers the material in the *Basic User Guide*; on-line help for more-advanced features is available by typing a question mark and the problematic command at the prompt. This entry produces a short explanatory note and an offer for more help if needed.

**SIGNING ON** Once you have entered RCA Mail for PCs, you immediately receive notice of any messages or incoming telexes that have arrived since you last signed on. You can then read these messages either one by one or by entering their individual numbers. You can also request messages sent to you either by specific people or on, before, or after specific dates. The program will either halt between messages or scroll straight through. You can stop the scrolling at any time by pressing Ctrl-S. Once you've read your messages, you can automatically answer them, discard them using the PURGE command, or save them under your own filename for future reference. However, you must dispose of them (and any unsent drafts) in some manner before signing off or the program will inform you that you still have unfinished business in your "workspace." You cannot sign off until you have accounted for everything.

The COMPOSE command by itself initiates a new message. It works very much like MCI Mail's CREATE command; you are immediately queried by the program for the recipient by a "To:" prompt, followed by "CC:" and "Subject:" requests. You can then enter the text of the message, either on-line or by downloading a previously saved ASCII text file.

You indicate the end of your message by typing a period in the beginning of a line. The program then asks if you want to send the message. If you want to send a "plain-vanilla" message, with no special options, you then simply type YES and it is immediately posted (the program gives you a confirmation).

RCA Mail for PCs offers a range of special options that can also be used at this point. By typing NO at the "SEND?" query and waiting for the command prompt, you can attach various useful criteria to your message, some of which are

```
WELCOME TO RCA MAIL!
RCA MAIL is a service mark of RCA Global Communications, Inc.
```

```
Your last access was Thursday, Nov 21, 1985 3:48 PM EST
Your access today is Thursday, Nov 21, 1985 3:52 PM EST
```

```
CHECK these bulletin boards:
RCA MAIL
```

```
No new mail.
```

```
Command? scan
```

```
No new mail.
```

```
Command? scan unfiled
```

No.	Delivered	From	Subject	Lines
1	Nov 18 14:32	ADMIN	RE: CREATE new list named PCLIST	7
2	Nov 21 14:05	A. GARRATT	demo of service	3
3	Nov 21 14:14	RCA TELEXTTRA	RCA THRU DATA MSG 7236 TO 256042	12

```
Command?
```

```
ESC for Attention. HOW to Switch Capture Off On. 00:01:52
```

By using RCA Mail for PCs SCAN UNFILED command, users can call up an opening screen that was previously displayed, as long as the messages were neither saved to an on-line "file" nor deleted in a previous session.

new to me. For example, you can classify a message as private so that the recipient must enter a personal ID number to read it; you can tag it for a receipt (so that you receive acknowledgement that it's been read) or as a registered message (the recipient must acknowledge the message before it can be read); finally, you can flag it as urgent and send it to the top of the recipient's list of messages. I found it interesting that RCA Mail allows you to send messages on or after a certain date or post them repeatedly for a specified time period (a feature that could certainly help executives remind their employees of deadlines). Finally, if you have sent a hastily composed message and decide that you shouldn't have sent it, you can use a CANCEL command to destroy it (providing that it hasn't already been read).

**QUICK AND EASY EDIT** In a previous review of electronic mail systems, I asserted that the one thing that all these systems had in common were unusable text editors. (See "In Touch with the Outside World," *PC Magazine*, Volume 4 Number 18.) While RCA Mail's editing system is certainly not up to word processor standards, it is head and shoulders above anything

else out there at the present time.

First of all, it does not force you to enter a separate edit mode to revise a typed message. Since RCA Mail uses a period to indicate a command during the creation or revision of a message, you can either type the period to end the message or immediately enter an editing command. For example, by typing .LIST you can generate a numbered line-by-line copy of your message. At that point, you can use other commands to delete or insert lines, continue the message, or renumber the message to take changes into consideration. You can also do a considerable amount of line-editing, and this function is where RCA Mail for PCs really shines.

Many commercial e-mail systems assume that you have a blow-by-blow memory of a six-page message; when you indicate that you wish to change a certain line, the program asks you for the change without showing you the line. RCA Mail uses a method similar to that of many noncommercial bulletin board systems. Once you have typed .MODIFY and the page or pages you need to edit, the program repeats the line and then gives you a blank line underneath it in which to type your changes. You can add and delete spaces,

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**Ira H. Krakow, Business Computer Systems**



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## ■ RCA E-MAIL

```
editing facilities.
I'm also going to try to show the immediate editing
facilities.
Barb
.list
10 This is a sample of an RCA e-mail message. I am writing
20 this for possible screen shots, and to show the programs
30 editing facilities.
40
50 I'm also going to try to show the immediate editing
60 facilities.
70
80 Barb
Continue!
.modify 50
50 I'm also going to try to show the immediate editing
..... ((( (you+ +nt +
50 I'm going to try to show you the immediate edit
..... { } various(( ing
50 I'm going to try to show you the various editing
.....
LEC 10F Attention: Home to Switch | Capture Vii | In 00:10:59
```

One of RCA Mail for PCs' most convenient functions is its on-line text editor. Notice that all changes are entered below the requested text by either substituting text or using easily learned symbols for deleting or inserting spaces.

words, and phrases; the only problem is if you have two long changes that occur close to each other in the same line. In that case, you are forced to edit the line twice, making each change separately. This system strongly reminded me of editing a hard copy manuscript; the only difference in this case was that changes were made underneath the line rather than above it. Once you have entered your changes and hit Return, RCA Mail shows you the new line and gives you another chance to edit it; if you press Return again, it will proceed to the next specified line or prompt you for your next action.

**MAILING LISTS** Individuals or small companies that wish to send the same message to several addressees can produce automatic on-line mailing lists with the system. After typing COMPOSE LIST, you are given a series of prompts to help you create such a list. All addressees must be previously registered with RCA Mail for PCs; unfortunately, you cannot combine the on-line and telex message service for this purpose.

RCA uses somewhat confusing terminology that is apparently a holdover from its intracompany service. At one point, the

prompt will ask, "Who can access?"; this is not a request for your addressees, but for the members of your assumed corporation. As an individual user, you are automatically assigned the level of subdivision, the name of which you must enter here. (Your user division is considered to be RCA Mail for PCs.) Once all that is made clear, you can then individually enter the names on your list. It takes from 24 to 48 hours for the names to be verified, and all the addressees will be sent notification that they are now on your list.

Unfortunately, while RCA Mail heavily supports telex and on-line communication, it does not have any facilities for hard copy mail. This lack could be a considerable problem in a system with a limited user listing (although not for those who intend to use it as an intracorporate communications system).

The company does encourage user comment. The COMPOSE command doesn't only signal a new message; in combination with other commands it gives access to Telenet numbers and rates and sends requests for help or critiques of the service directly to RCA.

In fact, I was very impressed with the range of facilities that RCA Mail for PCs

offers. Previously read messages can be put back into your current mailbox (so that they are automatically brought up the next time you sign on), filed away for future reference, or put into a sort of limbo (called unfiled) until you decide what to do with them. If you purge a message and then suddenly realize that you made a bad mistake, you can un purge it if you change your mind within 24 hours. Since there is a storage charge for messages kept after 5 days, you can also set a facility called AUTOPURGE, which (as the name implies) automatically deletes your messages after

■ It has become almost a prerequisite among on-line communications systems to also offer a database of some sort. RCA actually offers two: the RCA Mail bulletin board and Hotline.

a specified length of time. And all these commands are laid out in the documentation and on-line help in a logical, easy-to-learn fashion.

**ON-LINE INFORMATION** It has become almost a prerequisite among on-line communications systems to also offer a database of some sort. RCA actually offers two: the RCA Mail bulletin board and Hotline.

The bulletin board is directly accessible from RCA Mail; any new messages are announced right after you sign on. By entering CHECK, you enter the bulletin board service and from there can read any messages that RCA has posted. Unlike the intracorporate RCA Mail service, which allows verified personnel to post messages on the corporate bulletin board, the RCA Mail for PCs bulletin board only contains messages from RCA itself concerning the

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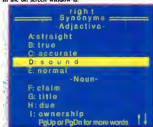


So you move your cursor to "A," which is the right "right," hit Return and the spelling mistake is instantly fixed. And the program you were working on has continued to run while you did a little spelling sidetrip with Turbo Lightning. (If you'd rather not remember your spelling grades in school, the beep might make you sick, but you can choose the "mute page" option. Which means that when you finish writing the entire page, any spelling mistakes will be highlighted. You go to bed and tomorrow things will be straightened out.)

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## ■ RCA E-MAIL

service. For example, when I signed on, I found a notice announcing updates to the READ command.

Since RCA's Hotline service, like RCA Mail, is derived from a telex-based communications system, it is accessible both by microcomputer and by telex machine. Hotline offers a large variety of information categories, including business and finance, commodities, general interest (horoscopes, film reviews, and the like), graphics (such as zodiac signs and holiday greetings—according to RCA, this is one of their most popular features), stock exchange information, newswire (national and international, sports, science and medical, and weather reports), and foreign language instructions and indexes. Hotline operates through the use of specific keywords for each category; there are also "quickcodes" for faster searching.

Unfortunately, however, Hotline is accessed separately at the Telenet prompt rather than directly from RCA Mail. This method can be an inconvenience for those who like to check out their mail and then drop immediately into the database. However, since you do not have to actually make another phone call, it could be worse.

All in all, RCA Mail for PCs is a well-organized, well-run electronic mail sys-

```
Command? compose list
CREATE a new list, ADD members, or DELETE members: create
Please enter the list name: tryout
Who can access this list: subdivision
```

```
Please enter SYS, ORG, DIV, SUBDIV, SEC, or SUBSEC to indicate the body
of users permitted to send to this list. Press RETURN for the default
setting of ORG.
```

```
Who can access this list: subdiv
```

```
Member: test.rca
Member: a.garratt
Member: g.smith
Member: x.fiction
Member:
```

```
Thank you! Information submitted.
```

```
There is no one registered by this name:
g.smith
```

```
Correct, Omit, or Hold:
```

```
ESC for Attention, Home to Switch, Capture Y/N, Ctrl: DD DD DD
```

RCA Mail for PCs allows you to create a mailing list by guiding you through with a series of prompts. Notice that, as an individual user, you are listed as a "subdivision." Addressees are checked for registration on RCA Mail; once you signal a completed list, the program asks you to account for discrepancies.

tem. As in most such services, its success may be based on how many users it can lure away from such well-used systems as MCI Mail and CompuServe—especially since subscribers who want to use it to con-

tact nonsubscribers will have to use the rather-more-expensive telex system. However, if RCA can overcome that single hurdle, it could end up leading the pack.

## E-Mail Systems: Summary of Features

System	On-line help	Hard-copy surface mail	Other mail services	On-line message edit	Menu mode	Expert mode	Message distribution lists	Storage	Bulletin board system	Database
EasyLink	Yes	Yes	Telex, Mailgram, Cablegram, Telegram, Express (overnight and 2-hour, courier-delivered)	No	Yes	Yes	Available through off-line arrangement	Messages held optionally for 3 days	Yes, through FYI	FYI News Service, Infact
ECHO	Yes	Yes	Overnight	Yes	Yes	Yes	Immediate on-line list creation	Messages stored indefinitely on ECHODisk	Yes	No
MCI Mail	Yes	Yes	Overnight, 4-hour courier-delivered, Telex	Yes	Yes	Yes	Immediate on-line list creation	24-hour storage w/basic service; 5 days w/advanced service	No	Dow Jones News/Retrieval
RCA Mail for PCs	Yes	No	Telex	Yes	No	Yes	On-line list creation w/ 24/48-hour verification	Messages stored indefinitely w/charges after 5 days	Yes	Hotline



# Borland introduces Traveling SideKick, it's your SideKick's™ sidekick!



## What's Inside the Organizer Binder

- ADDRESS BOOK SECTION**  
PRE-PRINTED FORMAT WITH DIVIDERS AND TABS FOR EASY REFERENCE
- PHONE DIRECTORY SECTION**  
PRE-PRINTED PHONE DIRECTORY  
COMPUTER OR MANUALLY UPDATED
- MISCELLANEOUS SECTION**  
TO STORE ALL EXTRA PRE-PRINTED FORMS AND COMMONLY USED RECORDS
- REFERENCE SECTION**  
CONTAINS MAPS, TIME ZONES,  
800 TRAVEL NUMBERS, TRAVEL  
ACCOMMODATIONS, ETC.
- FINANCE SECTION**  
EXPENSE REPORTS, RECEIPT LOG AND  
STORAGE ENVELOPE, CREDIT CARD  
INFORMATION, ETC.
- CALENDAR SECTION**  
YEARLY, MONTHLY WEEKLY AND DAILY  
CALENDAR WITH APPOINTMENT  
SCHEDULE
- PENDING SECTION**  
A "BUILT NOW" SECTION FOR CURRENT  
PROJECTS, MEETING NOTES, ETC.
- STORAGE POCKETS**  
FOR BUSINESS CARDS, CALCULATOR  
OR RECEIPT STORAGE, ETC.
- TRAVELING SIDEKICK SOFTWARE**  
A REPORT GENERATOR TO CONVERT, PRINT  
AND UPDATE ALL INFORMATION

## Traveling SideKick is the organizer for the Computer Age!

Traveling SideKick is both a binder you take with you when you travel — and a software program — which includes a Report Generator — that generates and prints out all the information you'll need to take with you. Information like your phone list, your client list, your address book, your calendar, and your appointments. (The Appointment Schedule or Calendar you're already using in your SideKick is automatically used by your Traveling SideKick. You don't waste time and effort re-entering information that's already there.)

One keystroke generates and prints out a form like your Address Book. (You don't need to change printer paper.) You simply use a standard 3-hole punch — which you can steal from someone else's desk — punch out the holes, fold and clip the form into your Traveling SideKick binder — and you're on your way. Because Traveling SideKick's binder and software are CAD (Computer Age Designed), you don't fool around with low tech tools like scissors, tape, or staples. Just one keystroke, 3 holes and you're on your way.

## You don't have a SideKick? You must be kidding.

More than half a million people already use Borland's desk top organizer, SideKick. (Winner of InfoWorld's "Product of the Year" award, it is also the #1 best-seller for the IBM PC™). Anyway, if you don't have one already you need one now and we'll give you a special price break. Buy Traveling SideKick and SideKick for only \$125.00 (Sold separately they add up to \$154.90, so you save \$29.90—which we hope you don't have to spend on cabs which take you the long way to the airport).

## What the software program and its Report Generator do for you before you go — and when you get back.

### Before you go:

- Prints out your Calendar, Appointments, Addresses, Phone Directory, and whatever other information you need from your data files.

### It can also:

- Sort your address files by name, zip code, or company name
- Print mailing labels
- Print information selectively
- Search files for existing addresses or calendar engagements

### When you return:

- Lets you quickly and easily enter all the new names and numbers, facts and figures you learned while you were away—into your SideKick data files
- Traveling SideKick does all of the above and more without needing special computer paper.

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CIRCLE 139 ON READER SERVICE CARD

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Sigma Designs.

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## ■ MARKET QUOTES

```

F2 - Options tables  F10 - Menu
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Detail Page: 4
-----
      LAST / BID  CHANGE  TR 45  VIX  H1  H2  Collections  /  MIX
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01/01/01  144.4  + 0.3  143.0  25.01  144.7  143.5  111.1  file
01/01/01  144.4  + 0.3  138.2  27.01  138.6  137.7  111.1  file
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01/
```

*This is Signal's quote display screen, the basic product FM technology delivers to your PC. Stock tickers appear in alphabetical order in the left-hand column, and the corresponding price and volume data appear in the adjacent columns.*

Ticker	Last	Basis	Holding	Change	Curr Val	Gain/Loss
APPL	22 1/8	21 5/8	100	1/2	\$2,212	\$50
IBM	130 3/8	123	500	7 3/8	\$65,187	\$3,800
C	32 3/4					
GE	42 1/4					
MSFT	178 1/2					
SPX	1180.69					
TRX	110.99					
TRX	6.8545					
TRX	60.97					
Total			1500		\$68,400	\$3,850

Help: [F1] Display prices, [F2] Display value  
 [F3] [F4] [F5] [F6] [F7] [F8] [F9] [F10] [F11] [F12]

Telemet America's program offers, in addition to a quote report screen very much like Signal's, a portfolio valuation screen. The system does the arithmetic to determine the basic valuation of the portfolio (\$93,662, in this example).

Now, for as little as \$1 per trading day, traders, other market professionals, and individual investors can all receive quotes continuously in a new, less expensive, more convenient way: through their PCs and an FM radio link. Two new hardware and software packages make it all possible: Signal from Lotus and Radio Exchange from Telemet America. With one of these packages and your PC, you can take advantage of the relatively new FM-to-PC quote services and receive broadcasts of quotes that stream straight from the exchange floors to your terminal.

**ALARMS AND ANALYSES** The chief benefit of these systems to investors is safety. You can set up the radio modem to watch your portfolio for you. If anything really frightful happens to one of your stocks, the PC can sound an alarm in plenty of time for you to cut your loss. Serious investors, who invest more heavily and therefore watch the market more carefully, should be able to justify the cost of an FM-to-PC link not simply in terms of dollars spectacularly won but in terms of dollars prudently protected. For them, purchasing an FM-to-PC link to a quote service is rather like installing an electronic burglar alarm to protect assets.

A second advantage for investors is the new analytical power you can tap with

your PCs after massively downloading low-cost FM data. The cost of bringing down quotes via FM is the same for 1,000 stocks as for 1 stock. The monthly charge for the FM quote service is fixed, regardless of usage. Individual investors can thus easily afford to track the performance of whole groups of stocks and then watch to see how a select few stocks are performing within and compared with those groups. FM also makes it economically feasible to keep the price-related items in a quite large fundamental database up to date on a daily or hourly basis.

In short, FM brings large-scale market analyses within your price range. Suddenly you have the luxury of access to as much up-to-the-minute price data as you want: FM delivers an incredible volume of data into your PC—and at low cost.

**QUOTE DELIVERY** Quote display terminals, sometimes called "quote machines," are indispensable to brokers, money managers, investment advisers, and some analysts. Typically fed by leased telephone lines used exclusively for this purpose, these terminals are the shop windows of the investment industry. Quote delivery is a big, strikingly profitable business. Last year, Quotron Systems Inc., the dominant domestic supplier of stock market quotes, with about two-thirds of the

business, had revenues of \$190 million and netted \$27 million on an installed base of 72,000 terminals.

Now that PCs have become commonplace in the financial services industry, the obvious step is to dispense with quote machines and feed quotes directly into PCs. The new FM radio services now offer a less costly direct link between the marketplace and the microcomputer. And PCs have more functions than just delivering quotes; they can be used for displaying quotes, monitoring multiple portfolios, and analyzing securities in-depth—all at one time. PCs are, therefore, much more practical than dedicated quote machines

**PC** **FACT FILE**

**Radio Exchange**  
Telemet America Inc.  
515 Wythe St.  
Alexandria, VA 22314  
(800) 368-2078  
(703) 548-2042

**Requires:** 128K RAM, one disk drive, serial card, FM antenna.

CIRCLE 440 ON READER SERVICE CARD

that perform only one of these functions.

The competitive pricing of the FM-to-PC services and the fact that PCs are so prevalent and powerful are making the hardwired quote services sit up and take notice. Quotron and other quote suppliers have introduced dial-up and dedicated phone-line quote services for PCs. But FM reception cannot be absolutely reliable, and the services that offer it do not supply a dial-up backup service. So the hardwired quote services, which are as reliable as the telephone lines, will persist for professionals, even though the FM services will challenge them and, more important, are creating an entire new market—the individual investors who monitor their securities' activities and perform long-term analyses on their PCs.

**HOW IT WORKS** Commercial FM radio stations broadcast the programming you receive on your personal radio within their allotted wavebands. They also broadcast subcarrier signals, which your radio ignores. Ordinarily, the subcarriers are just wasted segments of the frequency spectrum, but they can be used to transmit information to specialized receivers. Some FM stations therefore make their subcarriers available for lease to produce extra revenue. The subcarriers are commonly leased by marketers of that brand, meaning background music you hear in elevators and supermarkets: Muzak.

In recent years, FM stock quote services have been building nationwide networks by leasing the subcarriers of commercial FM broadcast stations in every major city in the United States. In most big cities, two or three stations broadcast quotes.

Until recently, the three major FM quote broadcasting networks were Bonneville Telecommunications, Telemet America, and Dataspeed. Last summer Dataspeed was bought out by Lotus Development Corp., and the network now operates as the Lotus Information Network Corp. The sudden appearance of Lotus as a major player in this field has changed the complexion of the business: After a decade of development in relative obscurity, FM data broadcasting technology is now finding wider acceptance.

Each quote service maintains a central

computer that gathers trading data from the stock exchanges. The data is initially transmitted from the service via satellite to receivers located at FM stations in various cities. The participating commercial FM station in each city then retransmits the satellite signal on a leased subcarrier.

To pick up the FM signal with your PC, you need a radio modem. Two of the three FM quote broadcasters now offer radio modems for the PC: Lotus and Telemet America. They will supply you with a modem when you subscribe to their quote ser-

■ The appearance of Lotus as a major player has changed the complexion of the business. FM data broadcasting is now finding wider acceptance.

vices. Bonneville Telecommunications, which pioneered this business, currently broadcasts to dedicated display terminals but is currently developing a PC modem.

A radio modem looks like any other external modem—a black box about the size and the shape of a book. It uses its own power supply and thus you must plug it into a wall outlet. The radio modem communicates with your PC through the serial port. A cable is supplied with the modem, but you must provide the port. The modem also requires an antenna.

Electronically, the "front end" of a radio modem is an FM radio tuned to the narrow subcarrier of the station in your city. The signal is detected, amplified, and used to drive the built-in modem. From this point, it is just as though the signals had arrived by telephone. The modem converts the incoming signal into a series of bits intelligible to the PC.

Stock, options, and futures quotes are broadcast and received in an alphabetically ordered stream of ticker symbols and their

associated price/volume data. When the complete list of tickers from A to Z has been broadcast, the process begins anew at the top of the list. In practice, this ticker "tape" takes a complete loop every 2 to 8 minutes.

The radio modem, equipped with some on-board memory (typically 64K bytes of RAM), stores the ticker symbols of the stocks, options, and futures of particular interest to you. The modem watches the ticker loop and extracts from it only the prices of the designated stocks, much as you might lift an item off a revolving tray.

The most current quotes are stored in the modem's RAM, where they are held available for display on your PC's monitor. The ticker loop is broadcast over and over again, so that the modem RAM is steadily refreshed with current data from the market.

An 8-minute loop has too slow a refresh rate to provide real-time market data, so whenever a stock is traded, the new quote for this stock is instantly inserted into the loop, immediately perceived by the modem's RAM, and displayed on the terminal right away. As the trading day progresses, actively traded stocks are constantly pushing up in line on the ticker loop. As you watch the screen, you're continuously informed of price fluctuations and accumulating volume.

The practical result of all this technology is a display screen you can bring up anytime you wish in the course of a trading day. (See screen photos.) A basic screen lists your stocks (or options, indexes, or

## PC FACT FILE

### Signal

Lotus Information Network Corp.  
1900 S. Norfolk  
San Mateo, CA 94403  
(800) 5-MARKET

List Price: \$595 for radio modem and support software (follows 250 issues at once). Subscriptions and exchange fees additional and as appropriate.

Requires: PC, XT, AT, or Compat Portable (will work with some other compatibles), 320K RAM, one disk drive, DOS 2.0 or later, serial port, FM antenna. 1/2-3 or Symphony recommended.

CIRCLE 646 ON READER SERVICE CARD

## ■ MARKET QUOTES

commodity futures) down the left-hand column and presents tabulations of their current price—high, low, last, the tick, the change since yesterday's close, bid/asked (for OTC stocks and options), and volume data.

**RELIABILITY OF RECEPTION** The major advantage of FM broadcasting is low cost, but the price you pay is unreliable reception. Occasionally, the FM signal grows so feeble that it stops updating the quotes on your screen. In fact, you may lose your quote feed altogether in a thunderstorm. Many market professionals must therefore use FM in tandem with a high-reliability service, probably via a leased line.

When the FM service is up—nearly all the time—you can save substantial sums in usage charges on other quote terminals. When it's down, the modem alerts you immediately.

An emergency dial-up access to the ticker loop would make FM more attractive to brokers and heavy traders. For advisers, analysts, and individual traders and investors, however, FM works just fine as a standalone system.

Although neither of the indoor antennas supplied with the two FM systems I reviewed was adequate, indoor antennas will work. I hooked up rabbit ears for this evaluation (even though they make the computer look preposterous). Some people are able to use tiny antennas fashioned from paper clips (more visually acceptable). The most common reception problem arises when FM signals bounce between and among downtown buildings and produce multiple signal paths. A circular polarizing antenna is the solution.

If you live beyond the transmitting radius of a major city, however, FM is not for you. Consider a direct satellite link instead. PC Quote in Chicago or Bonneville Telecommunications in Salt Lake City can tell you more about such links.

Both Lotus with Signal and Telemet America with Radio Exchange offer you essentially the same basic FM-to-PC product, using the same basic technology.

**SIGNAL** The Signal package from Lotus includes Lotus's radio modem and the software that supports it. Signal is aptly

named and beautifully packaged. The documentation is thorough, clear, and impressive.

The radio modem downloads quotes in real time on up to 20,000 stocks, options, and futures. It has sufficient on-board RAM to track 250 issues at any one time. If you want to track a different set of 250 stocks, you must erase the existing set and wait a few minutes for the ticker to update the quotes on the new collection of 250. You can set high- and low-price alarms on

■ With Signal, if you're using your PC for some other purpose, like word processing, the modem will continue to watch over your stocks.

any stock that you track.

An attractive feature of Signal is its off-line alarm. If you're using your PC for some other purpose, like word processing, the modem will continue to watch over your stocks. If one heads south, the modem will beep. You can then reload Signal's program, examine the report screen, and discover precisely which stock is in trouble. You enter the alarm trigger levels for each security from the keyboard and set them for both high and low prices.

Signal had a previous incarnation as Dataspeed's Modio. The new package differs from the old in at least two respects, which are quickly evident: price and software. The price is somewhat higher, and the software is somewhat more promising.

Dataspeed used to offer for free a rickety little bridge program to download quotes from the modem into 1-2-3. Lotus has so completely automated this process that you can transfer quotes into the spreadsheet almost instantaneously. If you own 1-2-3 or Symphony, the practical benefit is this: You can set up a portfolio management worksheet for your stocks using the spreadsheet and then—from within 1-

2-3—update your portfolio constantly by pulling in fresh quotes from the modem's RAM. The spreadsheet (since it is a spreadsheet) can automatically take care of expansions (100 shares  $\times$  23.88 per share = \$2,388 current value), calculate percentage gains and losses, and create totals. Instead of watching the simple tabulation of quotes provided by the basic Signal package, you can instead watch a 1-2-3 worksheet in which your complete portfolio is kept current in real time.

It's up to you to configure the spreadsheet as a portfolio manager and to write macros to scan the modem frequently for fresh quotes. Some sample worksheets are included with the program to accomplish all this, but they do not interact with the radio modem as the documentation insists they should. The Signal customer-support people confirmed when I called them for help that the sample portfolio manager did not work and, in their view at least, could not be made to work. "Just write one of your own," they suggested. "It's easier."

Setting up a simple portfolio monitor is easy, but the sample worksheet had promised more. It was supposed to keep track of both realized and unrealized capital gains. The problem is probably just an isolated macro, but I was disappointed that the program balked.

If you're a financial professional or you don't wish to devote time to spreadsheet programming for your Signal—or if you do not own 1-2-3 or Symphony—I suggest you look into the *Window-on-Wall-Street*

## PC MAGAZINE FACT FILE

**Window-on-Wall-Street**  
Bristol Financial  
Systems Inc.  
1010 Washington Blvd.  
Stamford, CT 06901  
(203) 356-9490

List Price: \$495 for basic program. Includes charting, scanning, and a historical database on 500 stocks. Package for multiple portfolio management additional.

Requires: 384K RAM, two disk drives (hard disk recommended), color/graphics card for viewing stock charts (preferably Hercules). Works with Signal hardware.

CIRCLE 647 ON READER SERVICE CARD

package from Bristol Financial Systems. *Window-on-Wall-Street* is a serious multiple-portfolio manager that includes a historical price/volume database and a good stock-charting facility. It's entirely menu driven and runs right out of the box on FM quotes from Signal.

The initial Signal package of hardware and software is \$595. Keeping it running costs \$100 a month in fees to Lotus. Because Signal conveys only real-time quotes (as opposed to 15-minute delayed quotes), you must pay fees to the exchange that is the source of the data. For individual investors these fees are not excessive: \$7.50 per month for the New York Stock Exchange (NYSE), for example. So the minimum monthly maintenance fee, for an individual investor, would be say \$105 to

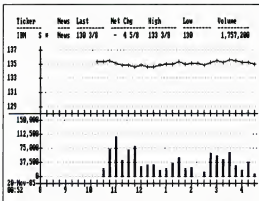
(a measure of market direction). You can choose from a menu to replace this basic tabulation screen with a valuation screen for your portfolio. It displays percentage and absolute gains and losses for individual issues and for the whole portfolio and updates these computed values as fresh quotes come in. This portfolio monitor is part of the basic Telemet software; you don't have to move data into a spreadsheet to display the portfolio.

If you do want to move the quotes into a spreadsheet for processing, you can download a DIF file of current quotes and subsequently upload it into a spreadsheet or database manager. I tested this feature by downloading quotes into 1-2-3, which is a DIF-compatible program. Within the spreadsheet, I set up a quote accumulator to stack up daily closing price and volume data for subsequent charting and analysis. The quote accumulator is like a warehouse plus a forklift truck for dealing with masses of low-cost price/volume data on the 500-odd high-technology stocks my investment advisory service monitors.

From a dial-up service the closing high, low, close, and volume data on 500 stocks daily could range from \$300 to \$700 per month. Via Telemet, it costs \$20 per month.

You can directly transfer Radio Exchange quotes to any DIF-compatible spreadsheet or DBMS. The transfer is less facile than Signal's instantaneous link to 1-2-3, but Telemet's DIF compatibility gives you alternative places to go with the data if you don't own 1-2-3 or *Symphony*.

You can accumulate 30 days of data within the Telemet software; a charting facility for the month's accumulated price/volume data is also provided as a menu item. If you find charting intraday index, stock, future, or option price movements



Telemet's software accumulates 30 days of closing price and volume data for charting. To chart stocks over longer periods, the FM data can be accumulated in a spreadsheet or a DIF-compatible charting package.

## ■ Radio Exchange costs about \$200 less than Signal initially, and it keeps watch over 78 more stocks and futures.

\$125 per month. Professionals pay more for the service than individuals (\$68 per month for the NYSE, for example), as they would for any other quote carrier.

**RADIO EXCHANGE** Radio Exchange seems to be a better value. The fully expanded version of the modem, with software and cabling included, costs about \$200 less than Signal initially, and the monthly subscription fees are substantially lower. It keeps watch over 78 more stocks and futures at any given moment and offers more than just quotes, including corporate news items on specific companies plus weather (important information for commodities players) and even sports scores.

The software provides the standard tabulation of tickers, ticks, last prices, change since yesterday, high, low, close, bid/asked, and volume. It also calculates trin

useful, Radio Exchange will handle that core, too.

The basic subscription fee is \$25 per month for all exchanges. This charge entitles you to 15-minute delayed quotes. If you prefer real-time quotes, Telemet typically charges \$10 a month plus an exchange fee. For NYSE and American Exchange (AMEX) quotes in real time, the charges come to about \$48 a month for individual investors. (For my own purposes the 15-minute delayed quotes are timely enough—and my company often trades options on OTC issues, which are notoriously slippery.) If you subscribe to Telemet's service for 3 years, you get rate protection over that period and the monthly fee drops to \$20 per month, or about \$1 per trading day.

Radio Exchange's RAM keeps watching your stocks while you're using your computer for other work, but it does not issue an audible alarm on preset trigger prices. You should thus load the program at regular intervals to check for any alarms, which appear as flashing bars across the tabulation of stocks. This limitation aside, the Telemet Radio Exchange package strikes me as a more-sensible investment than Signal. ■

*Michael Gianturco is president of High Technology Investments, an investment advisory service in Houston.*





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*li-brary \ 'li-brer-ē 1: any classified group of objects, collected and arranged for use or study.*

Consistent with this definition, DynaMicro Software Corp. has developed an impressive collection of fully integrated accounting applications aimed at the high end of the PC accounting system market. This system, called *The Business Library*, was originally written for a multiuser environment and has been available for the PC since 1982.

*The Business Library* system contains eight accounting modules: General Ledger, Accounts Payable, Accounts Receivable, Sales Order Entry, Inventory, Payroll, Purchase Order Tracking, and Time Accounting and Project Tracking. Three utility modules—Librarian, Business Analyzer, and Information Retrieval—complete the basic accounting system. Several other complementary modules are available from DynaMicro, including programs for word processing and tax planning.

We reviewed the single-user version of this package using an IBM PC-XT. DynaMicro recently introduced a multiuser version of its accounting software based upon 3Com's local area network (LAN). We were told by representatives from the company that it would soon release multiuser versions utilizing both the IBM PC Network and Novell Inc.'s Netware LAN.

The Librarian module, which you need

to run the other applications, controls the installation of each package. This process consists of establishing passwords and other parameters required to run the system (printer codes, company name, drive designations, and so forth). Once you've installed the Librarian, you can install any or all of the other modules as you need them.

In general, we were impressed with *The Business Library* software. However, of all aspects of this capable package, we were least impressed with the ease of installation. Although tasks are explained in detail, more-complete batch files would improve the installation process because the many steps you must go through make it a bit cumbersome. However, our impression of the system improved as we grew more familiar with the software.

*The Business Library* employs a somewhat unique approach to accessing all of the ancillary functions associated with processing transactions. It uses the transaction entry screen to control the entry, modification, inquiry, deletion, printing, and posting of transactions. Straying from the typical multilevel menu structures, *The Business Library* uses function keys to control all of these functions through a single screen. As we became familiar with the system, we found it convenient to be able to enter, print, and post information without leaving the original transaction entry screen. Furthermore, we found that displaying these functions at the bottom of the screen reminded us to complete the re-



*DynaMicro Software's The Business Library offers a powerful set of integrated applications modules with impressive features. Not an easy program, it's best-suited for users with computer and accounting training.*

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quired printouts and postings.

The *Business Library* supports multi-level password security. When you install the system, you create a password for each user specifying which programs each user will be allowed to access and execute.

In printing reports, you can direct them to a disk file by specifying a disk filename instead of the printer. However, when we tried to specify the screen (CON: or SCRNI:), the system aborted and gave us a fatal error, forcing us to reboot the system.

**ACCOUNTS RECEIVABLE** The Accounts Receivable module functions nicely as either a standalone package or as an integral part of *The Business Library's* Sales Order Entry module. As is the case with other *Business Library* modules, it integrates neatly with the General Ledger. Some comparable packages "book" all accounts-receivable financial transactions to single cash and accounts-receivable accounts. *The Business Library* allows you to establish up to four general ledger accounts for both cash and accounts receivable, which you use for recording cash and customer invoices. In addition, it allows four different finance charge percentages and three variable aging periods. The installation procedures for this module guide you in establishing these parameters. You must also enter sales personnel and customer information before you can begin invoicing operations.

The sales personnel function captures the salesman number, a name and address, and sales data for the period, year to date, and last year. The salesman number is used to create a list of sales by salesman for the period, a report that is usually adequate to assist you in determining salesman commissions.

The customer master file contains all of the codes and information for managing and controlling your customer accounts. The package is generous, allowing four lines of name and address before the city, state, and ZIP code. You can enter a phone number, a credit contact, a credit rating, and a "class" code such as an SIC code by which to group your customers. These codes are handy for sorting certain of your customer-related reports. For control purposes, you can enter a credit limit. The system will alert you if you enter a sale that

exceeds the established credit limit. You establish codes for tax rates, finance charge percentages, and discount rates by customer, so that the transaction entry programs can perform these calculations automatically at the time of invoice entry. You can maintain customer records using either the "open item" (tracking specific invoice amounts) or the "balance forward" (tracking a single customer balance) method, and you can have the system produce customer statements weekly, monthly, or not at all for each customer.

The system receives invoice data directly from the Sales Order Entry module. In addition, you can enter invoice data manually, or you can set up recurring invoices to be generated periodically. The invoice entry screen, used to capture invoices, displays a running batch total as well as a total of the detail that you have entered so that you can "batch total" your invoices for control purposes. We found this method of invoicing to operate quite smoothly.



G. William Dauphinais is a management consulting services partner in the Sacramento, California, office of Price Waterhouse and has long been a regular writer of and contributor to *The Price Waterhouse Report*.



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voice. Like the invoice screen, the cash receipts process is quick and easy to follow.

Based on the information you have coded for each customer, the system will automatically generate statements weekly and monthly and add the appropriate service charges to the accounts of customers who are late in making payments. Unfortunately, the statement format is predefined, so you can't tailor its appearance to your specific needs.

In addition to the basic accounts-receivable reports you'd expect in such a package, additional features are included that

## ■ The bill of materials processor represents the most dramatic difference between The Business Library and comparable accounting packages.

enhance the overall usefulness of the system. For example, you can print mailing labels sorted by customer or classification, and you can create custom dunning letters with your own word processor and import them into *The Business Library*.

**INVENTORY CONTROL** The Inventory module is a cornerstone in *The Business Library* system. It integrates with the General Ledger, Accounts Payable, Purchase Order Tracking, and Sales Order Entry modules. In addition to being a full-featured inventory control system, it also acts as a capable bill-of-materials processor. In setting up the system, you are given a choice of four costing methods: LIFO, FIFO, average cost, and standard cost. You can also establish multiple inventory sites and sections (locations) within those sites. You can set up product category codes that allow you to group your inventory by type of product and designate the general ledger accounts that are affected by transactions for this item's category.

The screen used to establish your inven-

tory items contains the obligatory item code, description, unit of measurement, cost, quantities (on hand, on order, committed, and in transit), and reorder information. In addition, the system allows you to establish for each item three vendors, a substitute part number (for the bill of materials), a cycle count (for physical inventories), and sales tax applicability (for order entry). When you use the site code, the system will keep physical inventories by site for each item number. This kind of multiple-site inventory-tracking ability is a rarity among microcomputer-based accounting systems.

The Inventory module is neatly integrated with the Purchase Order Tracking and Sales Order Entry modules—it receives the bulk of the transaction data directly from other modules. Inventory adjustment transactions can be entered using two methods. An inventory adjustment screen lets you quickly adjust quantities to reflect damaged goods, shrinkage, data entry error, and so forth. A physical inventory function provides for similar adjustment to item quantities but controls these changes with tag numbers, tag counts, and quantity hash totals to help ensure that an accurate physical inventory count was made. The system can produce detailed journals to properly document these changes.

The Inventory module creates a variety of valuable reports in addition to the standard master file lists. They include a purchase requirements list based on predefined order points for each item, an inventory valuation list, an inventory price/cost comparison, a cycle count list for taking physicals on a periodic basis, and lists of uncommitted, overstocked, and obsolete items. Each of these reports is available by site and for the entire inventory.

As previously mentioned, the Inventory module also has a bill-of-materials processor. By combining item numbers that you use for your regular inventory, you can create "assemblies" (bills of materials) that include parts, labor, and other assemblies and subassemblies. The labor items in an assembly are entered into another master file where you indicate the unit of measure and the general ledger account to which labor charges are to be post-

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Circle 15 on Reader Service Card

COMPUTER MAIL ORDER

# This is for all the power users technologies before they

Other than Steve Wozniak and Jonathan Rotenberg, there are probably only 2,998 personal computer users who qualify as trend setters. They're the people who owned Apples® when everyone else thought Apple® was a record label. People who were called hackers when a hacker was someone no one wanted to play golf with.

However many of you there are, this ad is for you. It's been designed and written to introduce you to a new technology without using superlatives or words like revolutionary. (We're saving those words for future ads targeted at the general consumer.)

The new technology is called the Softstrip System. This ad tells you what it's all about.

## THE SOFTSTRIP SYSTEM ENCODES DATA ONTO PAPER

Softstrip technology allows text, graphics, even digitized sound to be encoded on a strip of paper. Providing an alternative to magnetic media and telecommunications for the recording, distribution and retrieving of information.

These data strips, each a structured pattern of black and white rectangles that look something like a condensed bar code, can be encoded with special software and read with a scanning device called the Gaussin Softstrip System Reader. The reader optically scans the strip, translates its contents into 8-bit code and feeds it into a personal computer's serial or cassette port, enabling automatic, error-free entry of printed data without using a keyboard.

publishers), or by using a laser or dot matrix printer and special software (appropriate for personal or business use).

If you want, you can generate strips that can be reproduced on a copier or versions that can't be. Either way, any data strip, whether it's printed in a newspaper, magazine or personal letterhead, can survive pen marks, scratches, even coffee stains.

Basically, anything you can put on a magnetic disk you can put on a Softstrip data strip, which should suggest numerous application possibilities.

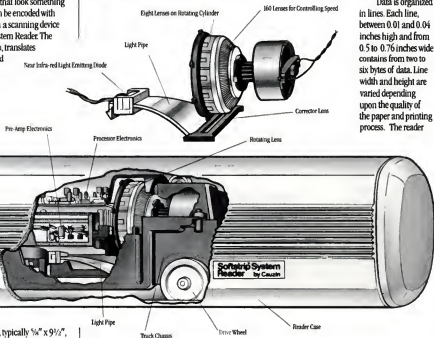
Starting in the next two months, data strips will appear in magazines, journals and books. These strips will contain program listings, tables of

## THE ANATOMY OF A STRIP

A Softstrip data strip contains not only software or data, but also information about its content, including file types, file name and the number of strips. Because of its inherent technology, strips are as accurate as any magnetic medium. And they can be entered into an IBM PC®, Apple II® or Macintosh® computer using the same reader with only slightly modified communications software.

Strips encode data bit by bit using highly structured optical patterns. The bits are each composed of two rectangles called di-bits. They function as optical on/off signals. White/black equals 1. Black/white equals 0.

Data is organized in lines. Each line, between 0.01 and 0.04 inches high and from 0.5 to 0.76 inches wide, contains from two to six bytes of data. Line width and height are varied depending upon the quality of the paper and printing process. The reader



One Softstrip data strip, typically  $\frac{1}{8}$ " x  $9\frac{1}{2}$ ", can contain up to 5,500 bytes of information. (For example, you could fit this entire ad on two strips.)

Strips can be printed by using a photographic negative (ideal for book and magazine

contents, new product demonstrations and data.

Eventually, strips may be used for everything from bank statements to sheet music.

scans each data line with a series of raster scans 0.0025 inches apart providing between four and sixteen scans per line.

# who want to know about new become household words.

A close-up view of a strip reveals five distinct sections. The header (1) at the top tells the reader the number of bytes in a line, the height of each line, and the paper to ink contrast level. Running vertically down the sides of the strip are the startline (2), the checkerboard (3) and the rack (4). They identify the boundaries of every horizontal line to be read. They also work in tandem to feed the reader alignment information.

Contained within the body of the strip, between the checkerboard and rack, is the file's data area (5).

Strip data accuracy is checked and error correction is provided by parity bits at the beginning and end of every data line, as well as by a strip checksum. There is also an optional 16 bit CRC. Combined, this design results in an undetected bit error rate

of less than one bit error per 10,000,000,000 bits.

## IT TOOK GUTS TO BUILD THE READER.

Rated for 25,000 reads, the reader is an equally impressive technology. It's composed of two key components: the case and the truck. While the case sits still, the truck moves uniformly down the length of the strip making a complete scan of the strip's di-bit lines every 0.0025 inches.

As the truck moves down the strip, it tracks its own lateral movement within five microns. Alignment is controlled by two servo mechanisms. As the truck moves, it illuminates the area to be scanned using near infra-red light beamed through a light pipe. (The infra-red technique permits the reader to see through colors, stains, and spills.)

The reader's optical scanning system, containing eight rotating cylindrical lenses and an aspherical corrector lens, forms an F1.2 optical system with a depth of field between 0.05 and 0.08 inches. A set of 160 additional cylindrical lenses on the rotating lens allow the system to control scanning speed.

Inside the reader, the mechanical system uses six AGMA-7 high precision plastic molded gears to provide very accurate truck movement. One gear system even allows for a 4000 to 1 angle reduction with no backlash for corrector lens alignment.

ATMS 7040 8-bit processor and Cauzin's own custom VLSI chip provide

reader logic, control and communications using four nested phase locked loops and several hardware and software servos. The reader transmits data to the host at 4800 baud burst rates with throughput of 1500 baud.

## HOW TO CREATE YOUR OWN STRIPS.

There are two ways to create Softstrip™ data strips. For large volume and greater density – up to 5500 bytes per strip – a film negative is created using special Cauzin software and hardware. This is ideal

for book, magazine, newsletter, data base and commercial software publishers who can reproduce a strip in volume using web, offset, gravure or similar processes.

For personal or business applications, 500 to 1000 byte strips can be

generated using Cauzin licensed software on dot matrix printers; up to 3400 byte strips can be generated using other Cauzin licensed software and laser printers.

In the next few months, you should start to see data strips appear in popular computer magazines, some new computer books, and those

consumer ads we told you about earlier. They'll look exactly like the working strip you see here, a medium density strip with an ASCII text file on it.

Of course you'll be able to purchase a reader at most computer dealers. They'll be selling for about \$200.00. Contact your dealer soon for a demonstration. Or call us directly at 203-573-0150.

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Softstrip

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Cauzin Systems, Inc.,  
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CIRCLE 330 ON READER SERVICE CARD

# The ONE and ONLY \$50 Complete Accounting System

## 17 NEW Features Make 118 Reasons To Buy MCBS Accounting Software!

### General Features

- 1) New automated start-up and installation procedure minimizes use of DOS commands.
- 2) For fixed disk, creates subdirectory and copies all files to disk.
- 3) Manual printing has been greatly simplified.
- 4) Menu Driven System
- 5) Integrated or Stand Alone
- 6) Simplified Installation
- 7) Complete Audit Trails
- 8) Data Files can be accessed by Lotus, dBase, etc.\*
- 9) Manuals on diskettes, print them on your printer.
- 10) Modules can be purchased separately.
- 11) Accounts and transactions limited only by disk space.

### General Ledger

- 12) Improved budget reporting module.
- 13) Improved integration with other modules including Payroll.
- 14) Supports multiple departments
- 15) Flexible chart of accounts.
- 16) Prints financial statements in flexible, user defined formats.
- 17) Prints Income Statement and
- 22) Balance Sheet by current month, current quarter, and 3 previous quarters.
- 23) Prints Departmental Income
- 28) Statement and Balance Sheet by current month, current quarter, and 3 previous quarters.
- 29) Prints Budget Comparison
- 30) Income Statement and Balance Sheet comparing Actual vs. Budget with variances and ratios.
- 31) Prints Trial Balance and Chart
- 32) of Accounts
- 33) Prior Period Adjusting Entries do not impact current results.
- 34) Data Entry screen displays beginning, current and ending balances as well as the last 10 entries.
- 35) System allows new accounts to be created during data entry.

### Accounts Payable

- 36) Vendors may be added to system during the entry of invoices.
- 37) Simplified selection of vendors and invoices for payment.
- 38) Provides for entry, updating and deletion of vendor information.
- 39) Allows entry, editing and posting
- 40) of payables, adjustments, cancellations and prepaids.
- 41) Prints the Open Item & Cash
- 42) Requirements reports.
- 43) Allows partial payments.
- 44) Prints A/P checks
- 45) Prints Check register.
- 46) Prints the A/P distributions to the General Ledger
- 47) Prints the vendor analysis report.
- 48) Interfaces to MCBS General Ledger or may stand alone.

### Accounts Receivable

- 49) Customizes your own headings on Invoices and Credit Memos. No programming required.
- 50) Add finance charges at the rate you choose to accounts you wish to charge.
- 51) Provides for entry, updating and deletion of customer information.

### Accounts Receivable Cont.

- 52) Allows entry, editing and posting of receivables, credit memos, cash payments.
- 53) Allows up to 99 repetitive line items for fast invoicing.
- 54) Prints the open item and aged receivables reports.
- 55) Prints Invoices, Credit Memos
- 57) and Statements.
- 58) Prints Sales Analysis.
- 59) Supports Partial Payments
- 60) Prints Invoice, Payment and Credit Memo Registers.
- 61) Interfaces to MCBS' General Ledger or may stand alone.

### Payroll

#### with State & Local Taxes

- 62) Now integrates with General Ledger.
- 63) Now prints 1985 W-2 and 1099-MISC forms.
- 64) Provides for entry, updating and deletion of employee information.
- 65) Handles hourly, salaried or
- 67) commissioned employees on weekly, biweekly, semi-monthly or monthly pay periods.
- 68) Calculates Federal, State and Local Taxes
- 69) Allows user to maintain all tax tables
- 70) Provides payroll history
- 71) Calculates the payroll
- 72) Prints the payroll register, check register and deductions register
- 73) Prints payroll checks
- 74) Provides for after-the-fact payroll
- 75) Prints W-2s, 1099s, 941s and
- 76) quarterly earnings reports

### Inventory

#### with Order Entry & Purchase Orders

- 79) Add Customers, Vendors or Items without
- 81) leaving the entry screen you are working with.
- 82) Reports allow selection by department or total.
- 83) WILD CARD customer feature allows creation of walk-in customer account for Point of Sale invoicing.
- 84) WILD CARD item allows for billing miscellaneous, non-inventory charges.
- 85) Uses Average Cost.
- 86) Provides for inventory item entry, updating and deletion.
- 87) Provides for order entry and editing with inventory update during entry.
- 88) Stock and non-stock items.
- 89) Handles purchases, returns, shipments and adjustments.
- 90) Prints invoices, credit memos, picking tickets, purchase orders, price lists and shipping labels.\*\*
- 91) Prints on preprinted forms or plain paper.
- 92) Prints stock status report and purchasing advice report.
- 93) Pull back order retention.
- 94) Quarterly, yearly and prior year inventory history.
- 96) Performs book to physical analysis.
- 96) Over 20 management reports
- 116) including extensive Sales Analysts and Lost Sales Report.
- 117) Interfaces to MCBS' General
- 118) Ledger, A/R, A/P or may stand alone.

\*\*Requires A/R & A/P for some functions.

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All programs run on IBM, iPC/XT/AT, AT/PT, EPSON, TANDY (1000/1200/2000), TL, WANG, COMPAG, CORONA, SANYO, COLUMBIA\*, and most other MS-DOS machines.

Requires 128K Ram, 2 Floppies or Fixed Disk, 80 Column Printer, MS-DOS, PC-DOS 2.0 or later.

\*Computer & software names are trademark or registered by their respective manufacturers.

### Client Accounting Software

This system is for people doing accounting work for other people. This is version 4.0, a new release. Call or Write for more details.

### Client Accounting System

\$150

(Does not include 5 module system)

Micro Computer Business Services

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Complete Package - G/L, A/P, A/R, P/R, INV	QTY	X \$ 50.00 ea =	
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Accountants' Client Write-up System	QTY	X \$150.00 ea =	
Pay Method Prepared, Check Enclosed			
MC, #		Shipping Charges =	\$ 6.00
VISA, #		If COD add \$5.00 =	
Expires: _____	Signature _____	TOTAL =	
Company Name _____	Contact _____	Phone _____	
Street/Number _____	State _____	Zip _____	
City _____			

## ■ THE BUSINESS LIBRARY

ed. Using the "kit pull" screen, you can enter the assembly you need to build and the quantity required. The system will then calculate how much inventory is needed. It will also warn you when there isn't enough inventory in stock. The screen prompts you to select a different site, ignore the shortage, or use a substitute part.

There are only a few bill-of-materials reports, but they give you most of the information you need to control your parts inventory. They include a costed bill of materials for each assembly through a total of up to 23 levels, an indented parts list, and a trial kit pull that generates assembly requirements and limits without changing quantities. Most of these reports can be printed one assembly at a time or for the entire inventory. Also, the system will display a "where used" list that shows the assemblies in which each item is used.

This bill of materials processor represents the most dramatic difference between *The Business Library* and comparable accounting packages. It's a capability most often seen only in specialized manufacturing software and could be quite useful if you need to track inventory quantities and costs in a light manufacturing operation.

**ORDER ENTRY** The Sales Order Entry module was written for companies that need to enter orders, create picking lists for warehouse order selectors, and then ship the goods selected by warehouse personnel. You can enter cash sales, but we don't believe this module would function all that well as a point-of-sale system. The billing process requires you to use multiple screens for charge sales, and you cannot print invoices from cash sales. However, as an order entry system for a distributor or manufacturer, the Sales Order Entry module performs quite well.

You can create a tax code file that contains a code, a description of the taxing agency, the tax percentage, and the general ledger account to which the tax data should be posted. The system will maintain a record of sales by tax code for reporting purposes.

There are two optional master files that can speed the process of billing customers. You can set up multiple shipping addresses for each customer. From the order entry

## COPY II PC OPTION BOARD

**At last,** an almost foolproof method of making archival backups of protected software! The Copy II PC Option Board is an add-in board that will give your PC the same disk duplication technology used by most disk duplication firms (who put the copy protection on software in the first place!).

### DUPLICATES NEARLY ALL\* PROTECTED DISKETTES!

The Option Board can easily backup almost all protected diskettes for the IBM PC, including ones software-only backup programs can't touch! It even includes a track editor that will allow the more technically inclined to look at protection schemes and edit any data on a diskette.

The Option Board uses a full size slot in an IBM PC, XT, or AT (with at least 1.360KB floppy disk drive), Compaq Deskpro, Compaq Portable requires an extra \$15 cable.

**CENTRAL POINT  
Software, Inc.**  
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Portland, OR 97219

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### ■ THE BUSINESS LIBRARY

screen, you can cycle through this list of addresses and choose the one you want. The discount/price screen gives you two methods of pricing the items that you sell. If you choose the discount method, you can set up a tiered discount schedule that you can apply to a price at order entry time. Each discount (up to four are allowed) is applied after the previous one has been applied. Although one discount percentage is common to most packages, many business situations require the use of a tiered discount schedule (10 percent, 5 percent, 2 percent, for example). This is one of the few packages we've seen that can handle these kinds of tiered discounts. The second method, the pricing method, allows you to set up ten prices in a schedule for each item. When entering orders, you can use either the price code that you assigned to a customer or one of the other nine codes assigned in the price schedule.

You can enter two kinds of orders into the system: charge sales and cash sales. No provision is made for standing orders (orders that can be invoked many times). The charge sales entry screen is divided into a header screen and a detail screen. Once you accept the header information, the system prompts you for each detail line of the order, including item number, quantity, site, tax code, discount code, and price. The cash-sales entry screen follows much the same pattern. However, as you would expect, this screen requires less header information.

Once you have entered your orders, you can generate picking lists to be used to select merchandise for shipping. Confirmation of the items being shipped (billing information, in effect) can then be entered. This function works smoothly, calculating back orders immediately. When you finish entering the shipments, you can create packing slips for all the shipments entered. Invoices for each customer shipment are not created automatically—you must initiate the production of invoices. You can invoice customers for all shipments made on or before a certain date or you can select only certain customers to bill.

One of the most useful reports produced by the order entry module is the backlog/back order report, which you can print out by customer, by day, and by item number and site. The system also lists lost

sales by item number so that you can tell if back orders for a given item are costing you sales. In addition, you can print gross sales for the last 13 periods, gross profit by item for sales this month, and sales for customers with activity above a user-specified dollar level.

**GENERAL LEDGER** The General Ledger module is a solid basis for financial reporting, although it is not the strongest module in *The Business Library*. An "nnnnn-nn-nn" account structure is used: the first four digits are the prime (or natu-

■ The Business Library's General Ledger module comes with five built-in reports that help you prepare your financial statements.

ral) account, the next two digits are the subaccount, and the last two digits allow you to code and report by cost center or department. You can specify that you have either 12 or 13 accounting periods, a feature that is not found in every package and is useful for companies that want to use 13 4-week accounting periods (as a retail enterprise might) or for audit adjustments that you don't want mixed in with the 12th-period transactions.

The chart-of-accounts entry screen allows you to enter the account, description, account type, current and previous-year opening balances, and periodic budget information. The screen also displays your current year's and prior year's activity.

Before you post journal entries, you must establish the various standard journal "types" (such as sales or cash) that will be used to segregate transaction batches as you post them. You can also set up recurring journal entries that can be posted as is appropriate each period. One word of caution, however, is that the system does not warn you that you may be posting the same



recurring journal entry twice in the same month, so you should carefully monitor the use of recurring entries.

The journal entry screen is very straightforward and allows you to enter transactions quickly. Batch numbers are established as a combination of the journal type and an assigned sequential number. These are assigned automatically as you enter transactions and help you control the accounting process. Once you complete a batch, the program immediately posts the transactions to the General Ledger—miraculously, without any hard copy batch edit report. This approach departs significantly from the standard procedure found in most other packages (enter transactions, print a journal, and post) and speeds the entry/posting process. On the negative side, such a system could make correcting mistakes difficult.

The General Ledger module comes with five built-in reports that help you prepare your financial statements. You can print a detailed trial balance (which prints all the transaction detail for the month), a summary trial balance (which summarizes the monthly detail by account), journal and batch activity reports of transactions entered, year-to-date detail activity for each account, and a summary chart of accounts.

You can also create tailored financial statements using *The Business Library's* custom report formatter. You'll have to invest some time in learning how to code reports, since, as always, sophistication breeds complexity. However, the effort should reward you, as the formatter gives you plenty of flexibility in setting up custom column and line formats. You can specify up to six columns of data per report format and up to 17 subtotal levels. In addition, you can create subsidiary schedules within a report to calculate certain lines on your financial statements. One very handy feature of the report printing program allows you to specify a single report format for use in reporting the results of many different cost centers.

You can consolidate multiple companies that you have established using *The Business Library's* General Ledger module. In order to do this, you set up a master company, and the system takes transactions from the companies that you specify and posts them to that company's ledger.

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**ACCOUNTS PAYABLE** The Accounts Payable module offers much the same flexibility as the Accounts Receivable module. The vendor file maintains a full complement of vendor-related informa-

tion, including up to seven characters for the vendor code, as well as the address, phone number, contact, classification (for sorting vendor lists), vendor rating, and period and year-to-date purchases. The

package also allows you to enter recurring invoices that you can post into the system as transactions at any time during the month.

The invoice entry screen is fast and simple, as is the rest of *The Business Library*. You enter the vendor code, invoice number, discount percentage, invoice amount and date, due dates, and discount dates into it. However, the module does not store the terms for each vendor in the vendor master file, so you must calculate your own due dates and discount dates. We found this to be a bit of a letdown in an otherwise capable system.

Once you enter the header information, you then enter the invoice's general ledger distribution. Contrary to the high degree of integration found in other *Business Library* modules, you must exit this program and go into another one in order to produce the invoice journal and post transactions.

The software has five different ways you can select invoices for payment. You can select all open invoices, all those due in a specific date range, all those eligible for discount, all open items for a vendor, or only certain specified invoices. In addition, you can make partial payments, cancel payments, and hold or release an invoice for payment. Once you've selected your invoices, you can print checks.

Some systems make it difficult to process manual checks, but *The Business Library* makes it quite easy. You simply enter the vendor, check number, date, and amount. Once you apply your check to the invoices that you paid, you can print a list of the manual checks and post them with the same program that posts automated checks. The Accounts Payable module also has a check reconciliation screen that allows you to keep track of outstanding and void checks, a feature not found in many packages.

**OTHER MODULES** In addition to the Purchase Order Tracking and Payroll modules, *The Business Library* also contains a Business Analyzer, an Information Retrieval module, and a Time Accounting and Project Tracking package. The Business Analyzer module allows you to generate most of the common financial ratios from data that you enter (say, industry averages) compared to and combined from

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data found in your general ledger. The Information Retrieval module allows you to extract information from most of *The Business Library* modules and put it into a fixed-length ASCII file you can then import into a spreadsheet or database for further manipulation. The Time Accounting and Project Tracking module interfaces with the Accounts Receivable and Payroll modules in order to assist professional firms in accounting for fees and expenses associated with client work.

**DOCUMENTATION** *The Business Library* manuals are polished and complete. They contain pictures and explanations of all the available screens and reports and describe the meaning of each and every system prompt. An appendix that describes backup procedures and possible system errors is also included.

The manuals could benefit from a more thorough overview of the entire system that explains how all the different modules and master file codes tie together. In setting up the modules, there were times when it wasn't clear to us until we switched to a different module why we needed to establish a given code or how it would be used. There is a lot to understand in such a powerful system; the user needs and deserves a few pages to do its capabilities justice.

**CONCLUSION** Installing *The Business Library* may be a challenge for anyone who has never used a PC or has never installed or used an automated accounting package. The software is best suited for those who have some accounting training and who understand how transactions flow through the various accounting processes. You may need your trusty accountant or computer consultant standing by during installation to help you understand all the interconnections and relationships between the modules.

*The Business Library* is a powerful set of integrated application packages with an impressive list of features. If you are willing to persevere and engage in some upfront planning, however, it may be worth your while to get yourself a library card and check this program out.

—Mike Falkner, Pat Fitzhenry, and G. William Dauphinais

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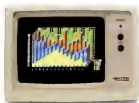
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All this has its price, of course. Besides the obvious cost of purchasing a laser printer, compatibility with the word processor you use is a major issue. Until recently, only the newest generation of PC word processor included provisions for driving the lasers. The cost of buying a new word processor isn't that great, but the

cost of retraining legions of *WordStar* users is tremendous. And what about the countless millions of words locked into the file formats of *WordStar* and other venerable text processing programs.

Worry not, faithful *MicroPro* addict. Help is at hand, in the form of programs that allow *WordStar* and other word processors to extract the full benefit from laser printers. The programs reviewed here bring the unruly laser beast to heel. Several are designed specifically for word processors that can't normally drive a laser printer. I've also looked at some utilities that work laser magic with any software and even one that takes the already powerful laser control of *Microsoft Word*, Version 2.0, a significant step further.

## ■ LASER UTILITIES

**POLARIS'S PRINTMERGE** *WordStar* is not totally ignorant of the laser printer. MicroPro has released a limited *WordStar* driver for the HP Laserjet, but it can currently use only the HP's internal Courier

fonts and is otherwise quite limited.

Polaris Software fills the vacuum by adding full Laserjet control to *WordStar* with its *PrintMerge* utility. *PrintMerge* is a standalone program that you use to print

documents instead of using the print functions built into *WordStar* itself. It incorporates a series of new dot commands and control sequence commands that you insert in the document in place of normal MicroPro commands. A large number of commands must usually be entered to set up the printer, font cartridge, margins and the like, but these can be stored in a small file and merged into your document when you need it.

Most of *PrintMerge*'s dot commands function identically or at least similarly to the normal *WordStar* commands. However, the command for right justification complicates matters somewhat. While

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## ■ Polaris Software adds full Laserjet control to *WordStar* with its *PrintMerge* utility.

*WordStar* has never had a true proportional printing function (at least officially). *PrintMerge* can right-justify even proportional Laserjet fonts. Special commands are used to specify line length and enable paragraph formatting. The only other major wrinkle is that you may have to enter a special command to justify the last line when a manual page break has been specified.

Special commands unique to the Laserjet allow you to change fonts within a document (as many changes as desired), feed paper manually (useful for printing enve-

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lopes), select paper size, print multiple copies, and so on. It uses *PrintMerge* instead of MicroPro's *MailMerge* utility; you have access to a full spectrum of standard commands (including the new conditional commands).

*PrintMerge* adds some useful functions

■ Most of *PrintMerge*'s dot commands function identically or similarly to WordStar commands.

not normally available with *WordStar*. For example, *PrintMerge* can create variable width horizontal lines, vertical lines, and boxes. It can also include charts created with *Microsoft Chart*. You specify size and page position settings while creating the graphics in *Chart*. This is not the most flexible mechanism—a lot of experimentation and bouncing back and forth between *WordStar*, *Chart*, and *PrintMerge* will probably be necessary. The limited buffer in the standard Laserjet restricts the size of lines, boxes, and charts, but these new functions are potentially useful nonetheless.

*PrintMerge* can handle multicolumn printing, but the mechanism is rather cumbersome. It's not as bad as the terrible machinations necessary to print columns in *WordStar* itself, but it isn't nearly as flexible and easy as the multicolumn printing available in competitive word processors.

On a more positive note, *PrintMerge* adds an absolutely terrific feature known as Keyboard Translation Tables, which allow you to print the extended characters in the Laserjet's Roman 8 set. An otherwise unused character can be assigned to one of the characters in the extended set. Ten such tables can be defined. This is by far the easiest and most flexible method I have seen to access the characters needed for international correspondence.

*PrintMerge*'s documentation (which is obviously printed with a Laserjet) is rea-

sonably good. It is clear enough for an experienced *WordStar* user but probably not easy enough for a beginner.

The copy-protected version of *PrintMerge* sells for \$99, an unprotected ver-

sion can be obtained for an additional \$25 after sending in the registration form, an arrangement that seems like a reasonable compromise in these days of ever-more-annoying-copy-protection schemes.

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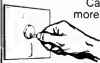
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## ■ LASER UTILITIES

*PrintMerge* works exactly as advertised—I had no problems with it after a brief learning period, during which I experimented with proportional spacing and the other new commands. The printed output completely matches that obtained using other word processors with the Laserjet, so *PrintMerge* clearly meets its design objectives.

The bottom line is you don't have to discard a faithful servant (and the tremen-

### ■ LaserPrint allows flexible and easy control over the use of Laserjet fonts.

dous investment in learning it)—you can still use *WordStar*, yet obtain the full benefit of the Laserjet all for only \$99! I strongly recommend it.

**BLAHA'S LASERPRINT** Blaha's *LaserPrint* is a utility to control the Hewlett-Packard Laserjet and Canon Laser Beam printers. It does not require use of a specific word processor because it works with any program capable of producing normal ASCII files. That includes spreadsheets and databases as well as word processors, which means you can create Laserjet multiple-font output with 1-2-3, *dBASE III*, or anything you like.

You control *LaserPrint* commands by embedding dot commands in the file. You can put the commands anywhere on a line (they don't have to be on the left margin). To add underlining, for example, you type:

The .ULunderlined.NUL word.

That command will look a bit strange to you if you're used to *WordStar*'s dot commands, but it quickly becomes comfortable.

Many of the *LaserPrint* commands merely issue standard HP commands to the Laserjet. Files of such commands can be used to configure the Laserjet for any printing job.

*LaserPrint* allows flexible and easy control over the use of Laserjet fonts. Fonts are specified with a dot command, provided that a "font file" has been prepared in advance for a given font. These files are nothing but simple text listings of a font's characteristics.

*LaserPrint* can also create raster graphics on the Laserjet. The program uses rows of asterisks to specify the dot patterns you want to use. While long rows may be necessary (depending on which dot density has been chosen), this method works very nicely for small patterns such as company or brand logos.

*LaserPrint*'s basic operation is straightforward. While it has no provisions for control of paragraph formatting, it is easy to achieve formatted output like that of *Microsoft Word*, *WordPerfect*, or other word processing programs capable of controlling the HP or Canon printers. *LaserPrint* is not as easy to use or as efficient as a word processor, however.

An enhanced version, *LaserPrint 2.0* adds more graphics capabilities to the basic package. This release can create graphic figures with commands like .LINE, .BOX, .REC, .SQUARE, .CIRCLE, .DISK, .ELLIPSE, and .OVAL. Each of these commands takes parameters specifying position, size, and, if appropriate, shading on a 12-tone scale.

The various *LaserPrint* commands work well, and it was easy to produce attractive output with several Laserjet font cartridges. The graphics commands created special effects that would have been difficult or impossible to produce with other programs. While advanced word processors are easier to use for run-of-the-mill

## PC MAGAZINE FACT FILE

#### LaserPrint

Blaha Software  
991 Massachusetts Ave., #1  
Cambridge, MA 02138  
(617) 354-1999

List Price: Hewlett-Packard versions, \$99, \$199; Canon version, \$199

Requires: 128K RAM, Hewlett-Packard Laserjet or Canon Laser Beam.

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output, *LaserPrint* is very good for small ads, in-house newsletters, or other documents that need a little something special.

The program's ability to dress up spreadsheet and database output is also appealing. Although output from these spreadsheet or database programs can be imported into a word processor and enhanced to a degree there, using *LaserPrint* is likely to be easier and more flexible.

*LaserPrint* performs well, and it should be an important tool in the arsenal of truly critical laser printer users.

**SOFTSTYLE'S PRINTWORKS FOR LASERS** *Printworks for Lasers (PWL)* is software designed to make using a laser printer more convenient and powerful. It currently supports the Hewlett-Packard and Canon laser printers and is likely to be expanded to include several recently introduced laser printers.

The laser printer driver portion of *PWL* installs as a device driver under DOS. Any of the serial or parallel ports can be used to connect the laser printer, and baud rates of 9600 or 19200 can be used with serial connections. *PWL* puts the correct values in the UART's registers for the higher speed.

The rest of *PWL* is a normal application, which you use by typing its name at the command prompt, just like any other executable program. The command can be added to the AUTOEXEC.BAT startup file, which may be desirable because *PWL* remains resident in memory while normal programs are running. It occupies about 45K bytes of RAM, so sufficient memory should be available for both *PWL* and whatever your normal programs require.

You invoke *PWL* by pressing the Shift-PrtSc keys. This key combination would normally cause a screen dump, but *PWL* can perform that function if needed, so nothing is lost by using the same key sequence.

On one level, *PWL* is merely a utility that changes the default settings of the laser printer. Such items as margins, perforation skip on/off, orientation, automatic or manual feed, lines per page, number of copies, and so on are easily changed on the program's main menu.

If this was all there was to *PWL*, it would still be a useful program, especially when you compare it with writing a BA-

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## ■ LASER UTILITIES

SIC program to control the laser printers (the Canon's command sequences are reasonably tough, and the HP's are a bear to use). Fortunately, that isn't all *PWL* does. It offers some really clever features that go well beyond the sophistication built into the laser printers.

For example, *PWL* includes a character set for the upper 128 positions of the ASCII code that emulates the IBM PC's standard character set—even if the characters aren't in a font cartridge. The generated characters aren't particularly good looking, but they work well enough to allow screen dumps that have real boxes and other IBM text graphics characters. *PWL* also adds emulation of the Epson MX-80, so that you can print Epson-compatible graphics (such as graphics screen dumps) and special graphics typefaces like those provided by *SoftStyle's PrintWorks* for dot matrix printers.

*PWL* includes a rather primitive "Memo processor" for quick notes or envelopes that can be printed immediately. *PWL* can also be disabled and printer output redirected to some other port, a feature that allows use of other printers as well as the laser printer. On-screen graphics images can be saved to disk and then resized and positioned on a page and printed. Printer output can be reduced by 33 or 66 percent or enlarged by 33 percent.

*PWL* includes provisions for the new HP Laserjet+. Up to six fonts can be downloaded to it and controlled by *PWL*. A font editor can be used to add fonts available through downloading or purchase of ROM cartridges.

*PWL* worked smoothly and without incident on the Laserjet, the Laserjet+, and the Canon LBP8. I tested *PWL* with over a dozen other memory-resident programs loaded and experienced no difficulty. *PWL* makes day-to-day use of a laser printer far more convenient and is well worth its cost on this score. Some of its fancy features can be wonderfully helpful on occasion.

**COMPUTER EDITYPE SYSTEMS' MAGIC SERIES** One of my favorite word processing programs isn't a word processor. *Magic Index* and its siblings, *Magic Bind* and *Magic Print*, are text-formatting programs that can be used in lieu of *WordStar's* printing facilities and *Mail-*

*Merge*. *Magic Print* is the simplest version and concentrates on formatting, *Magic Bind* includes a mail-merge facility, and *Magic Index* adds automatic indexing and a table of contents. Advanced features, such as footnotes, proportional spacing, multiline headers and footers, automatic chapter and section numbering, and much more, are also available.

*Magic* works like *Polaris's PrintMerge* in many respects. You use dot commands (with double dots instead of the normal single dots) for a very long list of print controls embedded in a *WordStar* file and use *Magic* to print the file. The type quality is perhaps the most notable improvement over normal *WordStar* printing.

*Magic* has now been upgraded for the Laserjet and Laserjet+, in both DOS and CP/M versions. It offers all the features mentioned above as well as enhancements

■ **Printworks for Lasers**  
offers some clever  
features that go beyond  
the sophistication built  
into laser printers.

for laser printing. Among the enhancements are six grades of boldfacing (available even with fonts that don't normally offer bold), line and box drawings, simple graphics for logos and letterheads, and odd/even page batch processing to facilitate double-sided printing. *Magic* can even do kerning (modify spacing between characters in 1/20-inch increments).

Text printed with *Magic* on a Laserjet+ is superb. Proportionally spaced material has an indefinable "something" that radiates professionalism. Computer EdiType Systems has always had a way with proportional text, but *Magic* surpasses even the fine quality obtainable with *Microsoft Word* and other word processors designed to handle lasers. The *Magic* series is a bit expensive, but considering that indexing and other advanced features are included with the

high-end version, it may prove to be a bargain for critical users.

**INSIGHT DEVELOPMENT'S LASER-CONTROL 100** LaserControl is the designation for a series of three products that control and enhance the operation of Laserjet and Laserjet+ printers. The products enable the Laserjet to emulate the Diablo 630, the NEC 5510/7750 or the Qume Sprint 5, and the Epson MX-80 printer. This combination of emulations, in conjunction with the normal Laserjet command structure, lets the printer run with almost any word processing or graphics program.

*LaserControl 100* does the emulations in memory on an IBM PC, IBM compatible, or Texas Instruments PC. The appropriate drivers are loaded once and remain resident until the PC is restarted or turned off. *LaserControl 200* is a printed circuit card that is plugged into the bus of an IBM or TI computer. *LaserControl 300* is a standalone box with similar circuitry and its own power supply. It can be used with any computer that has an RS-232 serial or Centronics parallel port.

I tested the *LaserControl 100* software version of LaserControl. Three software drivers can be used, one for the basic *LaserControl* functions and one each for daisy wheel and graphics printer emulation. The emulation drivers occupy 2.5K bytes and 6.2K bytes of RAM, respectively, which is quite compact for their functions. Both emulation drivers need be loaded only if both emulations are required, so the minimal memory consumed can be reduced by loading only one. *LaserControl* also controls sending



## FACT FILE

### Printworks for Lasers

SoftStyle Inc.  
7192 Kalamianuole Ave.  
Honolulu Kai Office Bldg., #205  
Honolulu, HI 96825  
(808) 396-6368  
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**■ LASER UTILITIES**

data to the Laserjet, so there is no need to use the DOS MODE command or other setup arrangements outside the program.

You interact with the *LaserControl* system using a beautiful menu program. Just as in 1-2-3, a command is selected by moving the cursor along a row of options or typing the first letter of the command. A brief description of each option's function is shown on the line below the option line. The ten lines below the menu are used for prompting and explanatory messages, and the bottom portion of the screen displays a "setting sheet" indicating how various options are set.

Once you select a printer to emulate, the setting sheet allows you to specify the

**■ You interact with the  
LaserControl system  
using a beautiful menu  
program.**

font cartridge, type style, how many copies to run, margin, and line and character spacing and make other adjustments. Modified setting sheets can be saved for future use.

My tests of *LaserControl* went smoothly and without incident. *WordStar* and 1-2-3 worked perfectly using the various printer emulations. Several programs that output Epson graphics produced lovely results on a Laserjet.

The hardware versions of the *LaserControl* system (not tested here) offer increased output speed. The internal *LaserControl* 200 card can operate from a PC's parallel port and thereby receive data faster than through a serial port. It uses a built-in microprocessor to free the host CPU for other tasks. *LaserControl* 300 has both serial and parallel input ports and can be used with almost any type of computer. The only catch to this is that the menu program is supplied only for PC-type computers, so CP/M users have to access the program through command-line instructions.

There are some other programs that

offer Epson emulation for the Laserjet (most notably *Printworks for Lasers*), but none that also emulate Diablo, NEC, and Qume printers. The ability to use existing word processing software rather than purchasing and learning a completely new system may be a critical factor for you. Many of the newer laser printers are now including Diablo emulation for just this reason.

*LaserControl* allows an HP owner to have the best of both worlds in many respects. The user interface is intuitive, familiar, and attractive. The product line is reasonably priced for what's delivered—an attractive adjunct to the Laserjet.

**SOFTCRAFT'S FANCY WORD AND FANCY FONT** Many available programs take advantage of the graphics abilities of dot matrix printers to add a multitude of fonts to them. Libraries of fonts have been created for programs like *Fontrix*, *Fantasy*, and *Fancy Font*. While laser printers are not impact printers (no dot wires or daisy wheel elements actually strike the paper), they are dot matrix printers.

At 300-dot-per-inch resolution, a laser printer's dot resolution is higher than almost any dot matrix printer's. Laser printers can also position their dots with unparalleled accuracy. This is what makes the eye think the characters are fully formed and typesetlike in quality.

Happily, the techniques used to create type fonts for dot matrix printers can be applied directly to laser printers as well. SoftCraft, developer of the highly regarded *Fancy Font* programs, has done

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**FACT FILE**

**Magic Series**

Computer EditType Systems  
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 New York, NY 10025  
 (212) 222-8148

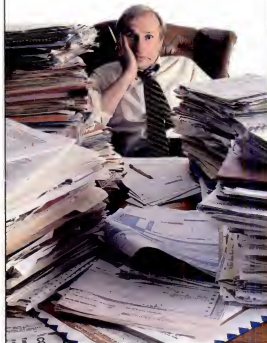
**List Price:** *Magic Print*, \$195; *Magic Bind* (including *Magic Print*), \$250; *Magic Index* (including *Magic Bind* and *Magic Print*), \$295

**Requires:** 48K RAM, Hewlett-Packard Laserjet.

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## ■ LASER UTILITIES

exactly that with two new programs for the HP Laserjet. *Fancy Font* itself has been released in an HP version, and a new program called *Fancy Word* adds custom typeface facilities to Microsoft's popular word processor, *Microsoft Word*.

*Fancy Font* has been reviewed here and elsewhere over the years, so I'll just

repeat the essentials. Dot matrix versions generate excellent quality text by making multiple passes of the printhead, often six or even more for certain typefaces, and by moving the head in increments as small as  $\frac{1}{216}$ th of an inch. Characters are defined in very dense matrixes in sizes up to 1 inch high. With the Laserjet's 300-dpi resolution, *Fancy Font* offers even better results.

*Fancy Font* works with the HP Laserjet and Laserjet+ as well as the Canon LBP-8 A1 laser printer. The Laserjet+ can accept a full page of graphics fonts, but the small buffer in the other printers restricts graphics fonts to smaller areas. The printers' internal or cartridge fonts are completely usable, and a normal document can contain a mixture of both native laser fonts and the special *Fancy Font* graphics fonts.

*Fancy Word* is modestly categorized by SoftCraft as "a special adaptation of

This is FixedWidth.

This is SansSerif.

This is SansCompressed.

This is Classic.

This is Roman.

This is RomanLight.

*This is Script.*

This is UnalantedItalic.

This is Tall.

This is OldEnglish.

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Π)S )S M-Λ(S†‡[‡S/←→

←  
→

With Softcraft's *Fancy Font*, the HP Laserjet can produce software-generated fonts that look just as good as the printer's internal or cartridge typefaces.

*Fancy Font* for use with *Microsoft Word*. It is certainly that, but it seems like much more. Using *Fancy Font* is a somewhat fragmented operation; you constantly jump back and forth between editor and *Fancy Font*. With *Fancy Word*, on the other hand, everything can be



### FACT FILE

#### LaserControl 100

Insight Development  
2115 Fourth St.  
Berkeley, CA 94709  
(415) 527-8646

List Price: \$180

Requires: 13K RAM resident, 35K RAM  
for menu program; Hewlett-Packard Laserjet  
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done from within *Microsoft Word* (assuming your setup is equipped with a hard disk).

*Fancy Word* integrates the graphics fonts directly into *Microsoft Word*'s Format Character command. The new fonts will appear on the menu of available font options. All the normal *Microsoft Word* formatting commands are used in their standard sense, including style sheets and the other advanced features. Since *Microsoft Word* is perhaps the most flexible word processor when it comes to output formatting, it was wise of SoftCraft to add *Fancy Word*'s capabilities on top of, rather than in lieu of, *Microsoft Word*'s facilities.

*Fancy Word* looks like a special printer to *Microsoft Word*. Printing is to a file rather than directly to a printer. Once the file printing is complete, *Microsoft Word*'s Library Run command is used to invoke a customized version of Pfont and the actual printing begins.

Both *Fancy Font* and *Fancy Word* worked flawlessly on my Laserjet+. Using *Fancy Font* with *WordStar* or an editor is perfectly workable, but the integration of *Fancy Word* is far superior for those using *Microsoft Word*.

The quality of the output from either program is simply gorgeous. The *Fancy Font* graphics typefaces do not look any rougher or less elegant than the laser printer's internal or cartridge typefaces (see sample). The Old English and Script fonts look fainter than the other fonts because they are stroke type fonts in which the 1-pixel-wide strokes are visible.

The huge library of optional fonts for

the dot matrix printers *Fancy Font* supports has been converted for laser printers. I tested half a dozen disks with varying sizes of Sans Serif, Sans Serif Compressed, and Classic typefaces in sizes from a minute 3 points to a giant 72 points. The process of incorporating new type fonts is a little tricky, but those who understand *Microsoft Word*'s PRD printer definition scheme or who can follow directions exactly should catch on quickly. The PRD file can be made larger than the memory *Microsoft Word* allocates, but the information necessary at any given point during printing can be "swapped" to and from disk as needed. My current PRD file has well over two dozen fonts and works like a charm.

Buying into the SoftCraft system will undoubtedly lead to more and more fonts over time. There are also supplemental program utilities for kerning, *WordStar* and *WordPerfect* adapters, and more.

Printing is a bit on the slow side when graphics fonts are used, but the added flexibility and output quality more than compensate. If the ability to incorporate a wide variety of typefaces into documents is important (and this is one of the primary reasons for buying a laser printer in the first place), I highly recommend the SoftCraft products. And if you use *Microsoft Word* with a laser printer, run to order *Fancy Word* immediately.

**SUMMARY** The programs reviewed here unleash the power of the laser printer for users of both the old favorite word processors and the new generation of PC powerhouses. The superb, near-typeset quality locked inside the arcane control sequences of the HP Laserjet line and the Canon Laser Beam series are now equally accessible to *WordStar* users, those with a favorite text editor, and *Microsoft Word* fans as well. ■

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## FACT FILE

*Fancy Word*  
*Fancy Font*  
SoftCraft

222 State St., #400  
Madison, WI 53703  
(800) 351-0500  
(608) 257-3300

List Price: *Fancy Word*, \$140;  
*Fancy Font*, \$180

Requires: 128K RAM, Hewlett-Packard  
Laserjet or Laserjet+ or Canon Laser Beam.

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# FIX UP COMMANDS WITH DOS-EDIT



*DOS command-line editing facilities are primitive at best. Here's a memory-resident DOS-EDIT utility that saves you keystrokes by providing full-screen editing.*

How many times have you reached for the Cursor up key to correct something you've mistyped at the DOS command level? I do it a lot. It's almost instinctive. The text is still there on the screen, so all you *should* have to do is move the cursor up, fix the text, and reenter. But this natural keyboard maneuver doesn't work in DOS.

I wrote DOS-EDIT to make it work. DOS-EDIT is a resident program that allows you to move to, edit, and reexecute DOS commands that are still on the screen, much as you can with the BASICA interpreter. And while of greatest use when you're on the DOS command level, DOS-EDIT will also work with such DOS programs as EDLIN or DEBUG, and with some other programs whose keyboard entry can be edited with the normal DOS editing keys (F1 to F5 and the cursor keys).

If you don't know about the DOS editing keys, you should at least start by learning about them. Strangely enough, they

got lost from PC-DOS 2.1 documentation when a separate *User's Guide* was split off from the main manual. (The *User's Guide* for PC-DOS 3.0 and 3.1 does describe them, and they do work under Version 2.1.) The DOS editing keys themselves, however, can recall only the immediately previous command. DOS-EDIT is often easier to use than the DOS editing keys even for that, and it can also retrieve other commands still on the screen, as well.

You can put DOS-EDIT.COM in your AUTOEXEC.BAT file so that it executes once and remains resident for the duration of your PC session. Because it intercepts some interrupts, it may conflict with other resident programs, particularly those that can be executed more than once. If you use the DOS ASSIGN program, for example, you'll want to execute DOS-EDIT in your AUTOEXEC.BAT file before ASSIGN runs for the first time. [The same holds true for SideKick—Ed.] In general, if DOS-EDIT does not seem to work at first, try

placing it earlier in your AUTOEXEC.BAT and rebooting.

**DOS-EDIT ON YOUR MACHINE** You can get DOS-EDIT.COM in one of several ways. The program is on the *PC Magazine* Interactive Reader Service, and you can download it via modem by calling (212) 696-0360. If you just want the executable program and your communications software supports the Xmodem file transfer protocol, you only need to download DOS-EDIT.COM.

If your communications software does not support Xmodem, you can download DOS-EDIT.ASC, rename it to DOS-EDIT.BAS, load it into the BASICA interpreter, and run it once. The DOS-EDIT.BAS BASIC program will create DOS-EDIT.COM for you. If you have no modem, you can type the DOS-EDIT.BAS program shown as Figure 1 into your BASICA interpreter and run it.

Although DOS-EDIT.BAS contains

```
100 REM -- BASIC PROGRAM TO CREATE DOS-EDIT.COM
110 OPEN "DOS-EDIT.COM" AS #1 LEN = 1
120 FIELD #1,1 AS A$
130 CHECKSUM = 0
140 FOR I% = 1 TO 77
150   LINESUM% = 0
160   FOR J% = 1 TO 8
170     READ BYTE%
180     CHECKSUM = CHECKSUM + BYTE%
190     LINESUM% = LINESUM% + BYTE%
200     LSET A$ = CHR$(BYTE%)
210     PUT #1
```

(Figure 1 continues)

Figure 1: This BASIC program will produce DOS-EDIT.COM.

## ■ PROGRAMMING/UTILITIES

```

220 NEXT J%
230 READ LINECHECK%
240 IF LINECHECK% <> LINESUM% THEN PRINT "Error in Line";280 + 10 * I%
250 NEXT I%
260 CLOSE
270 IF CHECKSUM = 59165 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
290 DATA 233, 46, 2, 40, 67, 41, 32, 67, 528
300 DATA 111, 112, 121, 114, 105, 103, 104, 116, 886
310 DATA 32, 49, 57, 56, 53, 32, 90, 105, 474
320 DATA 102, 102, 45, 68, 97, 118, 105, 115, 752
330 DATA 32, 80, 117, 98, 108, 105, 115, 104, 759
340 DATA 105, 110, 103, 32, 67, 111, 46, 0, 574
350 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0
360 DATA 128, 0, 0, 0, 0, 0, 0, 125, 253
370 DATA 2, 130, 2, 137, 2, 194, 2, 140, 609
380 DATA 2, 194, 2, 153, 2, 194, 2, 167, 716
390 DATA 2, 175, 2, 178, 2, 195, 2, 201, 757
400 DATA 2, 46, 198, 6, 55, 1, 0, 128, 436
410 DATA 252, 10, 116, 5, 46, 255, 46, 47, 777
420 DATA 1, 46, 198, 6, 55, 1, 255, 156, 718
430 DATA 46, 255, 30, 47, 1, 46, 198, 6, 629
440 DATA 55, 1, 0, 46, 198, 6, 58, 1, 365
450 DATA 0, 207, 251, 46, 128, 62, 55, 1, 750
460 DATA 0, 116, 13, 46, 128, 62, 58, 1, 424
470 DATA 0, 117, 46, 128, 252, 0, 116, 5, 664
480 DATA 46, 255, 46, 51, 1, 156, 46, 255, 856
490 DATA 30, 51, 1, 61, 0, 72, 117, 24, 356
500 DATA 232, 57, 0, 46, 128, 62, 58, 1, 584
510 DATA 0, 116, 234, 232, 33, 0, 46, 255, 916
520 DATA 6, 56, 1, 46, 254, 14, 58, 1, 436
530 DATA 207, 128, 252, 2, 115, 210, 128, 252, 1294
540 DATA 0, 116, 232, 232, 9, 0, 46, 128, 763
550 DATA 62, 58, 1, 0, 202, 2, 0, 83, 408
560 DATA 46, 139, 30, 56, 1, 46, 138, 7, 463
570 DATA 42, 228, 91, 195, 80, 83, 81, 82, 882
580 DATA 87, 30, 6, 140, 200, 142, 216, 142, 963
590 DATA 192, 180, 15, 205, 16, 254, 204, 136, 1202
600 DATA 38, 59, 1, 180, 3, 205, 16, 137, 639
610 DATA 22, 60, 1, 232, 124, 0, 58, 54, 551
620 DATA 61, 1, 116, 97, 180, 2, 205, 16, 678
630 DATA 180, 0, 156, 46, 255, 30, 51, 1, 719
640 DATA 60, 27, 116, 81, 60, 8, 117, 11, 480
650 DATA 10, 210, 116, 226, 254, 202, 232, 226, 1476
660 DATA 0, 235, 219, 60, 13, 117, 12, 232, 888
670 DATA 117, 0, 176, 13, 170, 254, 6, 58, 794
680 DATA 1, 235, 203, 60, 32, 114, 24, 128, 797
690 DATA 62, 62, 1, 0, 116, 5, 232, 178, 656
700 DATA 0, 235, 7, 185, 1, 0, 180, 10, 618
710 DATA 205, 16, 232, 68, 0, 235, 175, 134, 1065
720 DATA 196, 45, 71, 0, 114, 178, 61, 12, 677
730 DATA 0, 119, 173, 3, 192, 139, 248, 255, 1129
740 DATA 149, 63, 1, 235, 153, 139, 22, 60, 822
750 DATA 1, 180, 2, 205, 16, 7, 31, 95, 537

```

(Figure 1 continues)

```

760 DATA 90, 89, 91, 88, 195, 138, 22, 60, 773
770 DATA 1, 195, 10, 246, 116, 2, 254, 206, 1030
780 DATA 195, 42, 210, 195, 10, 210, 117, 6, 985
790 DATA 138, 22, 59, 1, 235, 236, 254, 202, 1147
800 DATA 195, 58, 22, 59, 1, 114, 5, 42, 496
810 DATA 210, 235, 12, 144, 254, 194, 195, 232, 1476
820 DATA 35, 0, 139, 22, 60, 1, 195, 254, 706
830 DATA 198, 195, 138, 14, 59, 1, 254, 193, 1052
840 DATA 42, 202, 42, 237, 176, 32, 180, 10, 921
850 DATA 205, 16, 195, 128, 54, 62, 1, 255, 916
860 DATA 195, 232, 63, 0, 195, 43, 201, 191, 1120
870 DATA 128, 0, 137, 62, 56, 1, 252, 180, 816
880 DATA 2, 205, 16, 180, 8, 205, 16, 170, 802
890 DATA 65, 254, 194, 58, 22, 59, 1, 118, 771
900 DATA 238, 79, 176, 32, 253, 243, 174, 252, 1447
910 DATA 116, 3, 254, 193, 71, 71, 136, 14, 858
920 DATA 58, 1, 195, 82, 139, 248, 232, 31, 986
930 DATA 0, 254, 194, 58, 22, 59, 1, 118, 706
940 DATA 245, 90, 195, 191, 32, 0, 138, 218, 1109
950 DATA 138, 22, 59, 1, 232, 9, 0, 254, 715
960 DATA 202, 58, 211, 125, 247, 254, 194, 195, 1486
970 DATA 180, 2, 205, 16, 180, 8, 205, 16, 812
980 DATA 151, 185, 1, 0, 180, 10, 205, 16, 748
990 DATA 195, 43, 192, 142, 216, 196, 30, 132, 1146
1000 DATA 0, 46, 137, 30, 47, 1, 46, 140, 447
1010 DATA 6, 49, 1, 196, 30, 88, 0, 46, 416
1020 DATA 137, 30, 51, 1, 46, 140, 6, 53, 464
1030 DATA 1, 14, 31, 186, 89, 1, 184, 33, 539
1040 DATA 37, 205, 33, 186, 130, 1, 184, 22, 798
1050 DATA 37, 205, 33, 186, 49, 3, 205, 39, 757

```

(Figure 1 ends)

checksums on each DATA line to help you find typing errors, you could still encounter other problems. If you get an "Out of data in line 170" message, you probably left out a line or two. If you don't get error messages on any line but you still get a "COM file is not valid" message, you may have typed one line twice.

If you get an "Illegal function call in line 200" message, it probably means that one of your DATA statements has fewer or

more than nine numbers in the line. Take out line 200 temporarily to track down the faulty line. Then put line 200 back in when everything is fixed.

If DOS-EDIT reports a "successful completion" but running or using the program causes your system to lock up, check that all your line numbers are correct. Finally, don't assume that the only place you could have made a typing error is in the DATA statements—check the program

part of DOS-EDIT.BAS also.

Probably the best way to get DOS-EDIT (and learn about it in the process) is to download or type in the assembly language listing shown in Figure 2 into a file called DOS-EDIT.ASM. You must then use the IBM or Microsoft Macro Assembler and use MASM, LINK, and EXE2BIN to assemble it into the executable DOS-EDIT.COM program.

(continued)

```

;      DOS-EDIT.ASM -- Resident DOS Command Line Editor
;      =====
CSEG      Segment
          Assume  CS:CSEG

KeyboardBuffer  Org  0080h
                Label Byte

          Org  0100h
Entry:        Jmp  Initialize

```

(Figure 2 continues)

Figure 2: The assembly language listing for DOS-EDIT.COM.

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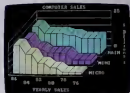
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## ■ PROGRAMMING/UTILITIES

```

;      All Data
;      -----

                                db      "(C) Copyright 1985 Ziff-Davis Publishing Co."

OldInterrupt21 dd      ?          ; Original Interrupt 21 vector
OldInterrupt16 dd      ?          ; Original Interrupt 16 vector
DoingBuffKey  db      0          ; Flag for doing Function Call 0Ah
BufferPointer dw      KeyboardBuffer ; Pointer to Keyboard Buffer
BufferCounter db      0          ; Number of characters in buffer
MaxCharCol    db      ?          ; Maximum Character Column on screen
OriginalCursor dw     ?          ; Place to save cursor on full-screen
InsertOn      db      0          ; Insert mode flag

KeyRoutine    dw      Home,Up,PgUp,Dummy,Left,Dummy,Right
              dw      Dummy,End,Down,PgDn,Insert,Delete

;      New Interrupt 21 (DOS Function Calls)
;      -----

NewInterrupt21 Proc      Far

                Mov      CS:[DoingBuffKey],0          ; Turn flag off initially

                Cmp      AH,0Ah                      ; Check if doing buffered input
                Jz       BufferedInput

                Jmp      CS:[OldInterrupt21]          ; If not, do regular interrupt

BufferedInput:  Mov      CS:[DoingBuffKey],-1         ; If so, turn on flag

                PushF                               ; Simulate regular interrupt
                Call     CS:[OldInterrupt21]

                Mov      CS:[DoingBuffKey],0          ; Turn off flag
                Mov      CS:[BufferCounter],0         ; Re-set character counter

                IRet                                   ; Return to user program

NewInterrupt21 EndP

;      New Interrupt 16 (BIOS Keyboard Routine)
;      -----

NewInterrupt16 Proc      Far

                Sti                               ; Re-enable interrupts
                Cmp      CS:[DoingBuffKey],0          ; Check if doing call 0Ah
                Jz       DoNotIntercept              ; If not, do old interrupt

                Cmp      CS:[BufferCounter],0         ; Check if chars in buffer
                Jnz      Substitute                  ; If so, get them out

                Cmp      AH,0                        ; See if doing a get key
                Jz       CheckTheKey                 ; If so, get the key

DoNotIntercept: Jmp      CS:[OldInterrupt16]          ; Otherwise, do old interrupt

```

(Figure 2 continues)

## ■ PROGRAMMING/UTILITIES

```

CheckTheKey:  PushF                               ; Save flags
               Call    CS:[OldInterrupt16]         ; Do regular interrupt

               Cmp      AX,4800h                    ; Check if up cursor
               Jnz      NotTriggerKey               ; If not, don't bother

               Call     FullScreen                  ; Move around the screen

               Cmp      CS:[BufferCounter],0        ; Any chars to deliver?
               Jz        CheckTheKey                ; If not, get another key

ReturnBuffer:  Call     GetBufferChar               ; Otherwise, pull one out

               Inc      CS:[BufferPointer]          ; Kick up the pointer
               Dec      CS:[BufferCounter]          ; And knock down the counter

NotTriggerKey: IRet                                ; And go back to calling prog

;      Substtute Key from Buffer
;      -----
Substitute:    Cmp      AH,2                        ; See if shift status check
               Jae      DoNotIntercept              ; If so, can't be bothered

               Cmp      AH,0                        ; See if get a key
               Jz        ReturnBuffer                ; If so, get the key above

               Call     GetBufferChar               ; Otherwise get a key
               Cmp      CS:[BufferCounter],0        ; And clear zero flag

               Ret     2                            ; Return with existing flags

NewInterrupt16 EndP

;      Get Buffer Character
;      -----
GetBufferChar: Push    BX
               Mov     BX,CS:[BufferPointer]        ; Get pointer to key buffer
               Mov     AL,CS:[BX]                   ; Get the key
               Sub     AH,AH                          ; Blank out scan code
               Pop     BX
               Ret

;      Full Screen Routine
;      -----
FullScreen:    Push    AX                            ; Save all these registers
               Push    BX
               Push    CX
               Push    DX
               Push    DI
               Push    DS
               Push    ES

```

(Figure 2 continues)

```

        Mov     AX,CS                ; Set AX to this segment
        Mov     DS,AX                ; Do DS is this segment
        Mov     ES,AX                ; And ES is also

        Assume  DS:CSEG, ES:CSEG    ; Tell the assembler

        Mov     AH,0Fh               ; Get Video State
        Int     10h                  ; through BIOS
        Dec     AH                    ; Number of columns on screen
        Mov     [MaxCharCol],AH      ; Save maximum column
        Mov     AH,03h               ; BH = Page Number throughout
        Int     10h                  ; Get cursor in DX
        Mov     [OriginalCursor],DX  ; through BIOS
        ; And save the cursor position

        Call    Up                    ; Move cursor up

MainLoop:  Cmp     DH,Byte Ptr [OriginalCursor + 1] ; If at line
        Jz      TermFullScreen      ; stated from, terminate

        Mov     AH,02h               ; Set cursor from DX
        Int     10h                  ; through BIOS

GetKeyboard:  Mov     AH,0            ; Get the next key
        PushF                      ; By simulating Interrupt 16h
        Call    CS:[OldInterrupt16] ; which goes to BIOS

        Cmp     AL,1Bh               ; See if Escape key
        Jz      TermFullScreen      ; If so, terminate full screen

;      Back Space
;      -----

        Cmp     AL,08h               ; See if back space
        Jnz     NotBackSpace        ; If not, continue test

        Or      DL,DL                ; Check if cursor at left
        Jz      MainLoop            ; If so, do nothing

        Dec     DL                    ; Otherwise, move cursor back
        Call    ShiftLeft           ; And shift line to the left

        Jmp     MainLoop            ; And continue for next key

;      Carriage Return
;      -----

NotBackSpace:  Cmp     AL,0Dh          ; See if Carriage Return
        Jnz     NotCarrRet          ; If not, continue test

        Call    End                  ; Move line into buffer

        Mov     AL,0Dh               ; Tack on a Carriage Return
        Stosb                      ; By writing to buffer
        Inc     [BufferCounter]      ; One more character in buffer

```

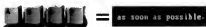
(Figure 2 continues)

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## ■ PROGRAMMING/UTILITIES

```

                Jmp      MainLoop                ; And continue
;
; Normal Character
; -----
NotCarRet:      Cmp      AL,' '                  ; See if normal character
                Jb       NotNormalChar           ; If not, continue test

                Cmp      [InsertOn],0           ; Check for Insert mode
                Jz       OverWrite              ; If not, overwrite

                Call     ShiftRight              ; Shift line right for insert
                Jmp      Short NormalCharEnd     ; And get ready to print

OverWrite:      Mov      CX,1                    ; Write one character
                Mov      AH,0Ah                 ; By calling BIOS
                Int      10h

NormalCharEnd:  Call     Right                  ; Cursor to right and print
                Jmp      MainLoop                ; Back for another key
;
; Cursor Key, Insert, or Delete Subroutine
; -----
NotNormalChar:  Xchg     AL,AH                  ; Put extended code in AL
                Sub      AX,71                  ; See if it's a cursor key
                Jc       GetKeyboard            ; If not, no good

                Cmp      AX,12                  ; Another check for cursor
                Ja       GetKeyboard            ; If not, skip it

                Add      AX,AX                   ; Double for index
                Mov      DI,AX                  ; into vector table

                Call     [KeyRoutine + DI]       ; Do the routine
                Jmp      MainLoop                ; Back for another key
;
; Terminate Full Screen Movement
; -----
TermFullScreen: Mov      DX,[OriginalCursor]    ; Set cursor to original
                Mov      AH,2                  ; And set it
                Int      10h                  ; through BIOS

                Pop      ES                    ; Restore all registers
                Pop      DS
                Pop      DI
                Pop      DX
                Pop      CX
                Pop      BX
                Pop      AX

                Ret                             ; And return to New Int. 16h

```

(Figure 2 continues)

```

;      Cursor Movement
;      -----
Home:      Mov     DL,Byte Ptr [OriginalCursor]    ; Move cursor to
           Ret                                     ; to original column

Up:         Or      DH,DH                          ; Check if at top row
           Jz       UpEnd                          ; If so, do nothing
           Dec      DH                             ; If not, decrement row
UpEnd:      Ret

PgUp:       Sub     DL,DL                          ; Move cursor to far left
           Ret

Left:       Or      DL,DL                          ; Check if cursor at far left
           Jnz      GoWest                         ; If not, move it left
           Mov      DL,[MaxCharCol]                ; Move cursor to right
           Jump     Up                             ; And go up one line
GoWest:     Dec     DL                             ; Otherwise, decrement column
           Ret

Right:      Cmp     DL,[MaxCharCol]                ; Check if cursor at far right
           Jb       GoEast                         ; If not, move it right
           Sub      DL,DL                          ; Set cursor to left of screen
           Jump     Down                           ; And go down one line
GoEast:     Inc     DL                             ; Otherwise, increment column
           Ret

End:        Call    TransferLine                   ; Move line to buffer
           Mov      DX,[OriginalCursor]            ; Set cursor to original
           Ret

Down:       Inc     DH                             ; Move cursor down one row
           Ret

PgDn:       Mov     CL,[MaxCharCol]                ; Get last column on screen
           Inc      CL                             ; Kick it up by one
           Sub      CL,DL                          ; Subtract current column
           Sub      CH,CH                          ; Set top byte to zero
           Mov      AL,' '                         ; Character to write
           Mov      AH,0Ah                         ; Write blanks to screen
           Int      10h                            ; through BIOS
Dummy:      Ret

;      Insert and Delete
;      -----
Insert:     Xor      [InsertOn],-1                 ; Toggle the InsertOn flag
           Ret                                     ; and return

Delete:     Call     ShiftLeft                     ; Shift cursor line left
           Ret                                     ; and return

;      Transfer Line on Screen to Keyboard Buffer
;      -----

```

(Figure 2 continues)



## ■ PROGRAMMING/UTILITIES

```

TransferLine:  Sub    CX,CX                ; Count characters in line
               Mov    DI,Offset KeyboardBuffer ; Place to store 'em
               Mov    [BufferPointer],DI      ; Save that address
               Cld                      ; String direction forward

GetCharLoop:   Mov    AH,02h              ; Set Cursor at DX
               Int    10h                 ; through BIOS

               Mov    AH,08h              ; Read Character & Attribute
               Int    10h                 ; through BIOS

               Stosb                      ; Save the character

               Inc     CX                  ; Increment the counter
               Inc     DL                  ; Increment the cursor column
               Cmp     DL,[MaxCharCol]     ; See if at end of line yet
               Jbe     GetCharLoop        ; If not, continue

               Dec     DI                  ; Points to end of string
               Mov     AL,' '              ; Character to search through
               Std                      ; Searching backwards
               Repz    Scasb               ; Search for first non-blank
               Cld                      ; Forward direction again
               Jz      SetBufferCount     ; If all blanks, skip down

               Inc     CL                  ; Number of non-blanks
               Inc     DI                  ; At last character
SetBufferCount: Inc    DI                  ; After last character
               Mov     [BufferCounter],CL ; Save the character count

               Ret                        ; Return from routine

;      Shift Line One Space Right (For Insert)
;      -----
ShiftRight:    Push    DX                ; Save original cursor
               Mov     DI,AX              ; Character to insert
ShiftRightLoop: Call   ReadAndWrite      ; Read character and write

               Inc     DL                  ; Kick up cursor column
               Cmp     DL,[MaxCharCol]    ; Check if it's rightmost
               Jbe     ShiftRightLoop     ; If not, keep going

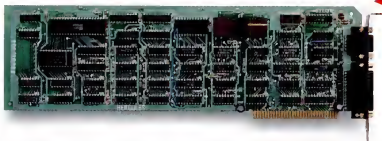
               Pop     DX                 ; Get back original cursor
               Ret                        ; And return from routine

;      Shift Line One Space Left (For Delete)
;      -----
ShiftLeft:     Mov     DI,0020h           ; Blank at end
               Mov     BL,DL              ; Save cursor column
               Mov     DL,[MaxCharCol]    ; Set cursor to end of line
ShiftLeftLoop: Call   ReadAndWrite      ; Read character and write

```

(Figure 2 continues)

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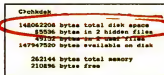
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DiskMeld allows you to add an Emerald subsystem to your existing drive and use the combined capacity as a single large volume. And, DiskMeld doesn't cost extra—it's a standard feature on all Emerald hard disk subsystems. To take advantage of it you select the DiskMeld option from the installation menu. Period. Everything else is done for you.

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Emerald subsystems are available in 30, 40, 55, 72 and 118 MByte capacities (formatted). Any of them can be combined with any of the others, or your existing drive, to give you the capacity you need. Even two 118's. All can be used as a single large volume.

What does "single volume" mean? It



C:\>chkdsk	
148062208 bytes total disk space	
135036 bytes in 2 hidden files	
49172 bytes in 2 user files	
147947520 bytes available on disk	
262144 bytes total memory	
210896 bytes free	

Actual printout of CHKDSK on an Emerald 118 MByte (formatted) subsystem after DiskMeld was used to combine it with an existing 30 MByte drive.

means no 32 MByte "DOS Barrier." It means you can have one single file the size of your formatted disk's capacity. However, you don't have to use it as one volume. When the installation software asks how many volumes you want, enter any number up to 24. Then, type in the size you want each volume to be, even if one or more of them are larger than 32 MBytes.

**"The fastest of all the disks we tested..."** Emerald hard disk subsystems are FAST. But don't take our word for it. "This disk screams. The fastest of all the disks we tested, the Emerald PS50 was, without question, the most impressive of the lot..." PC Week. Other industry publications feel the same way (see chart).

To build a subsystem that outperforms anything in its class, we start with the best

hard disks available. Control Data Corporation, for example, supplies us with disk drives that have Rotary Voice Coil Actuators, a dedicated take-off and landing zone and an average access time of 30 milliseconds or better. These drives are integrated into a complete subsystem that uses proprietary Emerald technology (which is 100% DOS compatible) to enhance the abilities and performance of the original disk.

## Dramatic improvement in average access time

The Emerald Disk Cache is a good example of our subsystem's performance enhancements. "One important Emerald advantage is its own cache memory, which allows data to be stored in RAM for the fastest access time possible." PC Magazine.

You choose to use disk caching at the time of installation. If you elect to use it, you are prompted for the size of the cache. That's it. You never have to think about it again. It's always there, enhancing the total performance of the subsystem, automatically.

## XENIX and things you don't see

XENIX is "disk intensive"—the operating system alone takes up nearly 10 megabytes of space. Additional users quickly use all the space available in a typical 40 megabyte XENIX system on an AT. Some hard disk vendors can give you more than 40 MBytes of XENIX compatible storage, but they extract a hidden price—in order to use their drives with XENIX you must replace the ROM BIOS chip on the AT's motherboard with the vendor's BIOS chip. That voids the manufacturer's warranty on your AT.

Emerald subsystems provide up to 118 megabytes of high performance hard disk storage that is 100% compatible with the IBM ROM BIOS—absolutely no motherboard modifications are necessary. Instead of a hidden price, Emerald subsystems have a hidden ability—they provide XENIX System III and System V storage without compromising existing hardware, software, warranty or service agreements.



Choose a configuration that meets the needs of your PC, XT, AT or compatible.

**Value added** We didn't stop with DiskMeld, incredible speed, password access, disk caching, the ability to "jump" the 32 megabyte DOS Barrier, DOS 2.X, 3.X and XENIX. Emerald hard disk subsystems also support the QNX operating system and a large number of networks such as Novell, PCNET, 3 COM...

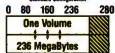
## Backing up on 1/4 inch tape

Emerald tape subsystems are designed and constructed to the same rigid standards as our hard disk subsystems. We start with the best tape drives available, then integrate them into a complete subsystem. In the case of our 1/4 inch tape cartridge drives, minimum acceptable requirements are the ability to accept data

## How DOS Sees Two 140 MB Drives



Standard Configuration



Emerald Configuration using the DiskMeld option of Extended Mass Storage Architecture.

Disk Overhead

DiskMeld combines the formatted capacities of two hard disks. Other Emerald features allow the drives to be configured as one large volume for use with IBM PCs, ATs and compatibles.

# to your AT's hard disk

at 5 megabytes per minute and consistency of operation.

Consistency of operation does not mean durability (that's a different requirement). It means that a cartridge written by one tape drive must be readable in an error free manner by a different drive.

Why is that important? The answer involves our disk subsystems. An important part of Emerald's Extended Mass Storage Architecture (EMSA) technology is our defect mapping technique. It permits our backup and restore software to check, and adjust to, the defect map of the drive it is writing to. Emerald users are shipping 100's of megabytes of data all over the world on our 1/4 inch tape cartridges—it is critical that each Emerald tape drive be able to read the tapes written by others, and that each Emerald hard disk subsystem accept that data, error free.

great speed and flexibility. It permits you to choose exactly what you wish to backup—everything on the physical disk, everything in a logical volume, a specified group of files, only files that were written after a specific time and date. ... ASP will even append data to a cartridge without destroying what's already there.

Best of all, it's FAST—up to 3 MBytes per minute in File-by-File and as fast as 5 MBytes per minute in the Streaming mode. (Actual speed varies, dependent on computer type, clock speed and the amount of RAM installed.)

## Network Compatible

Emerald cartridge tape subsystems provide full support for Novell Local Area Networks (LANs), including special files. That means you can backup and restore system, shareable, non-shareable, read-only, user rights

and directory access rights files. You can even perform on-line backup while users are logged on the network.

## True XENIX backup

XENIX has several commands built into it which are useful when backing up or restoring data.

Emerald was the first (again) to announce a true XENIX backup in the 1/4 inch cartridge format—one which takes full advantage of XENIX commands such as "tar," "cpio" and "dd."

## Do I need two subsystems, one tape and one disk?

No. Although both are available in stand-alone configurations, we recommend that you get one subsystem to do it all—an Emerald disk/tape subsystem. But, whatever your needs, Emerald has a subsystem configured to meet them. Choose an internal subsystem, one that is external and portable or one that includes 6 expansion slots for your PC.



Novell compatible cartridge tape subsystems support special files, user access rights, directory access rights and permit backup operations while users are logged on the network.

## Emerald stays with you

Over 60% of the inquiries we get about our products are from referrals. One of the reasons for this is our one year limited warranty. Another reason for the phenomenal number of referrals is our "hand holding." We stay with you—through our technical support department, which is available 12 hours a day to assist you with problems.

Believe it or not, we even call you sometimes, just to see how things are going, or to ask what features you'd like to see in the next generation of Emerald products. Our products are loaded with value added features and benefits because we listen to our customers.

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Easylink: 62653804

Publication	Average Access Time	Comments
PC Week	25.26 ms	"This disk screams."
PC Mag	25.10 ms	"... outstanding performance."
PC Prod	24.71 ms	"... superior choice, ... lightning fast."
PC Week	26.30 ms	"—this one screams too."

Independent tests by major publications all agree—Emerald subsystems are FAST.

**Easy as 1-2-3** Archival Storage Protector (ASP), our backup and restore software, operates from a Lotus-like menu. Functions are on the top line and a description of the currently highlighted function is on the second line. You select functions by typing the first letter or using the cursor control keys. You backtrack or exit by using the Escape key. A continuously updated light bar graphically illustrates the percentage of backup completed.

Emerald's proprietary Qic-02 interface card has only four jumper switches for changing I/O address. DMA channels and interrupt levels are controlled from the keyboard via ASP.

The complete tape subsystem provides

## ■ PROGRAMMING/UTILITIES

```

Dec    DL                ; Kick down cursor column
Cmp    DL,BL            ; See if at original yet
Jge    ShiftLeftLoop    ; If still higher, keep going

Inc    DL                ; Put cursor back to original
Ret                                ; And return from routine

; ----- Read and Write Character for Line Shifts -----
;

ReadAndWrite:  Mov     AH,2                ; Set Cursor from DX
               Int     10h                ; through BIOS

               Mov     AH,08h             ; Read Character and Attribute
               Int     10h                ; through BIOS

               Xchg    AX,DI              ; Switch with previous char

               Mov     CX,1                ; One character to write
               Mov     AH,0Ah             ; Write character only
               Int     10h                ; through BIOS

               Ret                        ; Return from Routine

; ----- Initialization on Entry -----
;

Initialize:    Sub     AX,AX                ; Make AX equal zero
               Mov     DS,AX              ; To point to vector segment

               Les     BX,dword ptr DS:[21h * 4]; Get and save Int. 21h
               Mov     Word Ptr CS:[OldInterrupt21],BX
               Mov     Word Ptr CS:[OldInterrupt21 + 2],ES

               Les     BX,dword ptr DS:[16h * 4]; Get and save Int. 16h
               Mov     Word Ptr CS:[OldInterrupt16],BX
               Mov     Word Ptr CS:[OldInterrupt16 + 2],ES

               Push    CS                  ; Restore DS register
               Pop     DS                  ; by setting to CS

               Mov     DX,Offset NewInterrupt21
               Mov     AX,2521h           ; Set new Interrupt 21h
               Int     21h                ; through DOS

               Mov     DX,Offset NewInterrupt16
               Mov     AX,2516h           ; Set new Interrupt 16h
               Int     21h                ; through DOS

               Mov     DX,Offset Initialize
               Int     27h                ; Number of bytes to stay
                                           ; Terminate & remain resident

CSEG          Ends
               End     Entry

```

(Figure 2 ends)

(continued from page 219)

**CRUISING AROUND THE SCREEN**

Once DOS-EDIT is loaded (normally through your AUTOEXEC.BAT file), you can best understand its operation by thinking of your keyboard input as being in one of two separate modes. The normal mode works just as you're accustomed, and you won't know DOS-EDIT is even resident. But when you press the Cursor up key you enter the full-screen mode and DOS-EDIT kicks into action.

While in full-screen mode, you can use the cursor keys to move the cursor to any part of the screen above the line from which you started. You are able to delete individual characters on the screen by pressing the Del key. The rest of the line to the right of the deleted character moves left. The Backspace key deletes the character to the left of the cursor and also moves the rest of the line left. The PgDn key deletes all characters from the cursor to the end of the line.

You can also type in regular characters while in full-screen mode. The typed characters will either overwrite existing text or be inserted into the line. The Ins key switches between these actions. The program starts with insert off.

While in full-screen mode, the Home key moves the cursor horizontally to the original column position—the column the cursor was on when you entered full-screen mode—but keeps the cursor on the same line. The PgUp key moves the cursor horizontally to the first column position of the current line, all the way over to the left of the screen.

You can exit from the full-screen mode and return to the line you started from in one of four different ways. First, if you move the cursor down to the original line, the cursor will instantly jump back to its original position and you'll be out of full-screen mode. Second, if you press Esc while in full-screen mode, you'll exit full-screen mode with no changes made to your original line. Third, if you press End, DOS-EDIT will transfer all text from the cursor to the end of the line (except trailing blanks) to the original line and leave the cursor at the end of the original line. Fourth, pressing Enter does the same thing as End, except that it also enters the resultant command line.

**HOW DO I USE IT?** The DOS-EDIT keystrokes may sound somewhat complex, but in actual use, you'll find them almost intuitive and simple to use. The Home key is the most important. Because Enter and End only move text that starts at the cursor position, you usually have to move the cursor to the beginning of the line, but not further left than the DOS prompt. Assuming you enter full-screen mode with the cursor just to the right of the DOS prompt, Home moves it back to that position.

A few examples will clarify the keystrokes:

(1) You entered a CD command but then realized you're on the wrong drive. To fix matters at this point, type in the correct drive, move the cursor up to the CD line, and press Enter. (If the length of your prompt changes when you change drives, you must position the cursor under the C in CD before pressing Enter.)

(2) You entered a long command but made a typing mistake. Move the cursor up to the line, correct the mistake (using the Del and Backspace keys and inserting characters as appropriate), press Home, and then Enter.

(3) You just did a DIR listing and you want to run one of the listed programs. Move the cursor up to the filename extension. Press PgDn to delete from the cursor to the end of the line. You can then enter any parameters, press PgUp to move the cursor to the left of the screen, and press Enter. Or, after deleting the filename extension, you can press PgUp to move the cursor to the beginning of the line, and End to transfer the line down to the command line without entering it. You may then enter the parameters and press Enter.

**A PROGRAMMER'S PROBLEM** I had originally wanted to make DOS-EDIT work in exactly the same way as the BASICA interpreter. That is, I wanted it to accept the entire line wherever the cursor was positioned on the line. This didn't seem like a big deal, but programmers often find that a task that at first appears straightforward can develop an ugly little hitch on closer examination.

The hitch in this case proved to be the DOS prompt. The DOS prompt is part of the line, but it is—inconveniently—a part

of the line that DOS-EDIT must ignore.

Why not just have DOS-EDIT ignore the first two characters on the line? No good. Most hard disk users I know use the PROMPT command with a \$p\$g argument to display the current subdirectory, so their prompts are longer than two characters. OK, then, why not just have DOS-EDIT ignore everything to the left of the first angle bracket character? That might be fine for your prompt, but mine doesn't even end with a right-angle bracket.

The prompt problem was such a nuisance that I even went so far as to consider having DOS-EDIT look in the Environment area to get the actual prompt string so DOS-EDIT could know what it was and ignore it. But a resident program like DOS-EDIT gets only a static copy of the Environment when it's loaded. If you change the DOS prompt after DOS-EDIT is loaded, DOS-EDIT has no way of learning about the change.

That is why DOS-EDIT only transfers text from the cursor position on, and why I provided the Home key to move the cursor back to the original starting column. When people ask of a program, "Why does it do it this way?" and "Wouldn't it make more sense to do it that way?" there are often good reasons. In the case of DOS-EDIT, the prompt made me do it.

With this little lesson on programming compromises, we can now take a closer look at the internal workings of DOS-EDIT.

**IT'S ALL IN THE INTERRUPTS** For an assembly language program that needs to get a whole line of keyboard input, the DOS Interrupt 21h function call 0Ah (Buffered Keyboard Input) is often ideal. All the programmer has to do is set up an area in memory to receive the string of keyboard input, make the function call, and DOS does the rest. After the user presses Enter, DOS returns the final string back to the program.

Moreover, if the string is returned intact to DOS the next time keyboard input is needed, DOS uses that string as a template and allows the user to recall and edit the string with the DOS function keys. (Because function call 0Ah is susceptible to Ctrl-Break and skips to a new line when the Esc key is pressed, it is not often used



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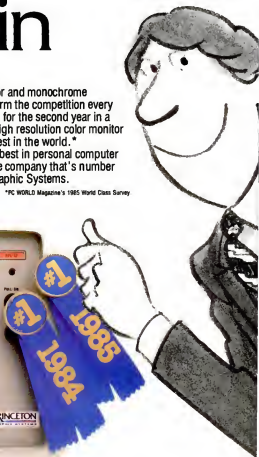
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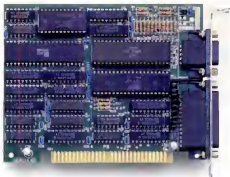
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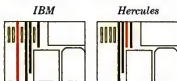
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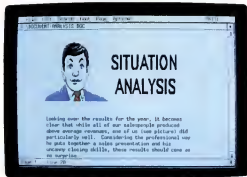
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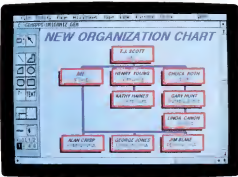
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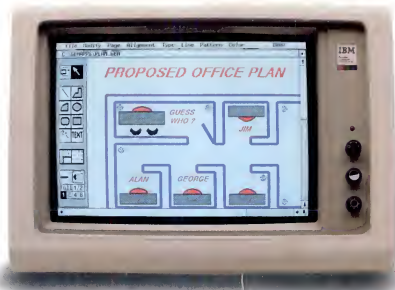


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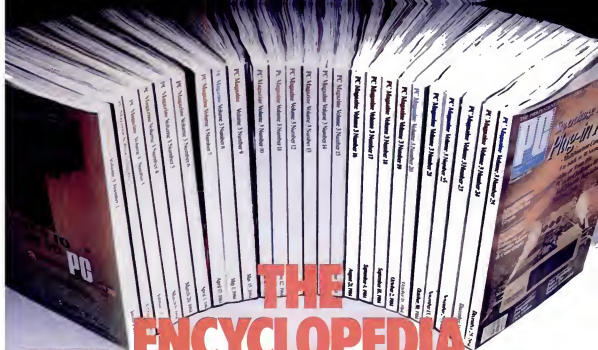
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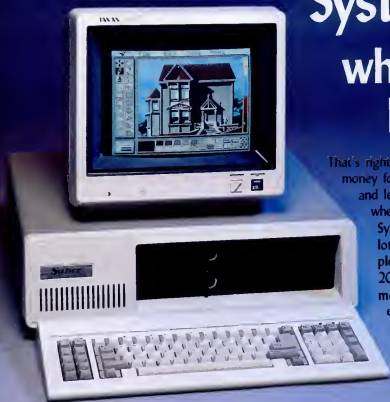
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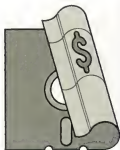
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CIRCLE 179 ON READER SERVICE CARD

■ EDITED BY JARED TAYLOR

# SPREADSHEET CLINIC



*This forum lets readers exchange the ingenious solutions and timesaving hints that make their spreadsheets and integrated software packages work better.*

## NUMLOCK REVISITED

You have run several submissions in your column from readers who have tried to solve the problem of entering 1-2-3 data with the numeric keypad without sacrificing the directional controls provided by the arrow keys. The best solution was Bill Taylor's macro in your August 6, 1985, column (Volume 4 Number 16), which I have reproduced as `^A` in Figure 1. When you run the macro, get into NumLock mode, type a number on the numeric key-

```
^A      (?) {down} /xg ^A~
^B      (?) {down} /xg ^B~
^C      (?) {down} /xg ^C~
```

**Figure 1:** A great macro (and two improved versions) that allows data entry on the keypad without loss of cursor control.

pad, and hit Return. The number will appear in the cell and the cursor will skip to the cell below, ready for the next number. It's great for entering a column of numbers, and you can put [right] in the macro instead of [down] if you need to enter a row of numbers. While the macro is still running, you can get out of NumLock and move freely around the spreadsheet. To enter more numbers, go back into NumLock. To end the macro, hit Ctrl-Break.

This is a great macro and one I have used for some time. However, while it is running, you can't use any 1-2-3 commands that end with a carriage return. By adding the tilde shown in macro `^B`, you will build in the necessary carriage return, so you can then do such things as `/Range`

Erase, `/Worksheet Insert Column`, and `/Worksheet Columnwidth Set` while the macro is still running.

Macro `^C` takes the process one step further and lets you do a `/Copy` operation that requires two carriage returns. If you've been running `^C` in NumLock mode, get back into normal mode. Then move the cursor to a cell to which you would like to copy something. Hit `/Copy` and then Esc to free the cursor. Move the cursor to the cell with the contents you want to copy and hit Enter. The copy operation will work perfectly, and the cursor will return to the cell below the one into which the copy was made. The two carriage returns in macro `^C` do not slow down its operation, and it is the most flexible of the three.

Ronny Richardson  
Chamblee, Georgia

*These are, indeed, improvements over what I had thought was the last word on NumLock. I have found that you can also use macro `^C` to /Move as well as /Copy. Moreover, after you hit Esc to free the cursor, you can move it to the beginning of a range, anchor it with the Period key, and indicate the entire range to be copied or moved. Also, if the cell(s) you want to copy from are far off in the worksheet, you can type their coordinates after hitting Esc.*

## ENTERING DATES

In the Spreadsheet Clinic of November 12, 1985 (Volume 4 Number 23), you showed a method for entering dates in 1-2-3. In Figure 2, I have included two alternative methods that I like better. To use the first,

```
^D      /rfd1 @date (86, {?}) ~
^L      /rfd2 @date (86, {?}) ~ {down}
/xg ^L
```

**Figure 2:** Two macros for entering dates.

put the cursor on the cell where you want a date and hit Alt-D. Type the numbers for the month and the day, separated by a comma, and hit Return. The date will appear in format 1. If you want a different format, change the number in the macro.

The second macro is a continuous loop that lets you enter dates in a column. After each date entry, the cursor moves to the cell below and waits for another date. To end the macro, hit Ctrl-Break. If you need to enter dates in a continuous row, just change {down} to [right].

Robyne Vaughn  
Glenpool, Oklahoma

*These are both good macros, but I prefer a variant as follows:*

```
/rfd1 ~ @date (86, {?}, {?}) ~
```

With your macro, you type a comma and then hit Return to enter a date. With this macro you don't type the comma; you hit Return twice. I find it easier not to have to bounce back and forth between Return and the Comma key.

## FINE PRINT WITH 1-2-3 AND SYMPHONY

If you have a printer that does subscript or superscript, you can probably use 1-2-3 and Symphony to do fine print. With an



## ■ SPREADSHEET CLINIC

Epson printer, the trick is to combine subscript and compressed modes and set the line spacing to  $1\frac{1}{2}$ /<sub>216</sub> inch. The printer setup string 015027S10273015 will do the job. (All 0s are zeroes.) If you have a different printer, you'll have to look up the control codes in the manual.

You can, of course, use fine print for anything you like, but I use it for RS-232 cable diagrams. What appears on the screen as Figure 3 will print out as Figure 4, which reproduces the exact size of the

/ppos[Esc]027064"qrAA4"q

To actually get 1-2-3 to send the reset code to the printer, you have to print a real print range, in this case cell AA4. Just be sure that the cell is blank.

Dan Lasky  
Memphis, Tennessee

## 1-2-3 SETUP STRINGS IN MACROS

If you write worksheet print macros that contain setup strings, you should be aware

well as page length and margins) to the default setting.

Robin Llewellyn  
Dallas, Texas

*For a belt-and-suspenders approach, just put 1 {Esc} at the beginning of any setup string in a macro. That will get rid of any string left over from a previous printing and make way for your string. The reason for the 1 (any character will do) is that if you begin the setup string with {Esc} and there is no remaining setup string, the Es-*

E		F	
3	This cable connects two IBM PC's	IBM PC	IBM PC
4	together through two asynchronous		
5	ports.		
6		1 ----- 1	
7	It is also useful in testing	2 ----- 3	
8	two async ports on the same	3 ----- 2	
9	system.	4 ----- 5	
10		5 ----- 4	
11		6 --	
12		8 -- ----- 20	
13		7 ----- 7	
14			-- 6
15		20 -----  -- 8	
16			
17		Female	Female

Figure 3: An RS-232 cable diagram as it appears on the screen.

This cable connects two IBM PC's together through two asynchronous ports.  It is also useful in testing two async ports on the same system.	IBM PC	IBM PC
	1 ----- 1	1 ----- 1
	2 ----- 3	2 ----- 3
	3 ----- 2	3 ----- 2
	4 ----- 5	4 ----- 5
	5 ----- 4	5 ----- 4
	6 --	6 --
	8 -- ----- 20	8 -- ----- 20
	7 ----- 7	7 ----- 7
	20 -----  -- 6	20 -----  -- 6
	Female	Female

Figure 4: The actual size of the same cable diagram using fine print on the Epson printer.

printout. I have set up the diagram so that once it is printed, I can cut it out and glue it neatly on one side of the DB-25 cable cover. The comments fit on the other side. The diagram and label eliminate confusion and will give your cables a finished, professional appearance.

After a print job, the printer will still be in fine-print mode, so I use this macro to reset the printer to its default mode:

that 1-2-3 will keep the setup string in its print settings until you clear it. Thus, if you print the same worksheet twice using different setup strings, the second string will be tacked onto the first string rather than replacing it. This will result in an error and stop the print macro. Therefore, it's a good idea to use the /Clear Format command from the print menu before you end the macro. This will return the setup string (as

cape will take you back one level in the printer menu and sabotage your macro. The 1 just gives you a setup string to clear if one didn't get left behind. If there is a leftover setup string, you'll just be adding 1 to a string you're going to get rid of anyway. And you don't even have to worry that the leftover string might already be 39 characters long and not take the extra 1; 1-2-3 will just beep when you try to add the 1 and will then clear the string.

## BYPASSING SYMPHONY SECURITY

One of the nicer things about *Symphony 1.0*—or so I thought—was its security feature. There is a format option, Hidden, that lets you hide cell contents. The contents do not show up on the screen but will appear in the control panel when you move the cursor to them. If you go to the settings menu and "lock" the spreadsheet with a password, the contents of the hidden cells will no longer appear in the control panel

## ■ SPREADSHEET CLINIC

either. You can/Save and/Retrieve the file normally, and you can look at all other cells, but you can't "unlock" and view the hidden cells unless you are able to give the password.

This sounds like very effective security, but, unfortunately, you can get around it very easily. All you have to do is combine a locked worksheet with another worksheet. From the services menu the thief need only follow this procedure:

```
File
Combine
Copy
Entire File
Ignore (line markers or
range names)
Values
Name of locked file
<Enter>
```

Hidden cells will still be hidden, but their contents will now show up in the control

■ **The Hidden option**  
hides cell contents so that they do not show up on screen but appear in the control panel when you move the cursor to them.

panel and you won't need a password to unhide them.

Niall MacDonagh  
Concord, New Hampshire

*This procedure works exactly as you say.  
Since file security is something of a cops*

*and robbers game, I hope the readers of this column are cops rather than robbers. Fortunately, the problem has been solved in Symphony 1.1. When using this more recent version, if you try to iCombine a locked file, you will get a message saying it can't be done.*

*Frankly, I prefer the file security technique used in 1-2-3, Version 2.0. With this approach, you lock the entire file when you save it. That way, without the password, you won't even be able to read the file back into 1-2-3.*

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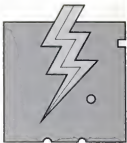
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# POWER USER

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## TURBO RENAMING AND RESTRUCTURING

When I first got my copy of Turbo Pascal 3.0, I discovered that the Rename procedure can actually move files across subdirectories on a hard disk. With just a few lines of code, I wrote RESTRU.PAS. The program renames the first file on the command line to the second file while changing the directory name if necessary. In addition, it will even rename directories in DOS 3.0 or later.

Michael Toutonghi  
Seattle, Washington

Mr. Toutonghi's RESTRU program (shown in Figure 1) is certainly one of the shortest useful Turbo Pascal programs I've seen. The Turbo Version 3 ParamStr function really comes in handy here. However, by relegating error handling to Turbo, you get some pretty ugly-looking messages if the program can't find the file or directory entry.

Neither of the two tasks RESTRU does—renaming directories and "restructuring" (shifting) files from one directory to another—is possible with the normal DOS RENAME command. Restructuring a file is like moving a file from one directory to another, but it's actually not a real move. The program simply changes the directory entry—which is all it has to do. Restructuring is a fast way of permanently getting a file from one directory into another without doing a COPY followed by an ERASE. It cannot move files from one disk to another, however.

Renaming subdirectories is often as im-

portant as renaming files, though how you do it has gone through some changes with the different DOS and BASIC versions. The DOS function call 56h, introduced with DOS 2.0 for renaming files, didn't work with subdirectories until DOS 3.0 came out. Since most programs written for DOS 2.0 (including the BASIC interpreter and the Turbo Pascal compiler) use that function call for renaming, they can't rename subdirectories under DOS 2.x.

Under DOS 3.0, the BASIC interpreter can rename subdirectories with the NAME command. For the brief period I used DOS 3.0, I used the batch file shown in Figure 2 for renaming directories. Using redirection of standard output, it creates a small file that contains a single BA-

SIC command. Then it runs BASICA using that file as standard input. I don't use it anymore, however, because BASICA 3.1 no longer allows using the NAME command to rename directories.

Recently, I've been renaming subdirectories by using a short C program called NEWNAME (shown in Figure 3). It can be compiled with the Microsoft C Compiler, Version 3.0. The difference in executable code size between it and the Turbo Pascal program is interesting: RESTRU.COM is over 11K bytes long while NEWNAME.EXE is a little over 2K. Replacing the last cputs with the perror function increases the .EXE size by about 750 bytes but gives you more specific error messages.

```
program restructure ;
{ Restructures files and
  renames subdirectories }
var filetochange : file ;
begin
  assign (filetochange, paramstr (1)) ;
  rename (filetochange, paramstr (2)) ;
end.
```

Figure 1: A Turbo Pascal, Version 3, program to "restructure" files from one directory to another and to rename subdirectories. Renaming subdirectories works only under DOS 3.x.

```
ECHO NAME "%1" AS "%2" >TEMP.TMP
BASICA <TEMP.TMP
DEL TEMP.TMP
```

Figure 2: RENDIR.BAT takes two arguments and renames the first to the second. It can rename subdirectories only under DOS 3.0 but can redirect files under DOS 2.0 and later.

## ■ POWER USER

```

/* NEWNAME.C -- Renames (or Restructures) Files and
   Directories */

main (argc,argv)
{
    int   argc;
    char  *argv[];
    if (argc < 3) cputs ("Syntax: NEWNAME oldname newname");
    else if (!rename (argv[2], argv[1]))
        else cputs ("NEWNAME couldn't rename");
}

```

Figure 3: NEWNAME.C is a C program to rename subdirectories (under DOS 3.x) and restructure files. It can be compiled under Microsoft C, Version 3.0.

RESTRU.COM, RENDIR.BAT, and NEWNAME.EXE will all rename subdirectories under DOS 3.0 and later and will "restructure" files from one directory to another under DOS 2.0 and later. None of the programs accept global filenames using the \* and ? wildcard characters, however. While global filenames are not particularly useful for renaming directories, they can be important for restructuring.

The real workhorse for restructuring files is John Dickinson's RED program (PC Magazine, Volume 4 Number 4, page 245). RED (which stands for "redirect")

accepts global filenames for massive hard disk reorganization. Do not use the .ASM listing shown in the magazine, however—there were serious printing foul-ups. Instead, get the corrected .ASM listing either by modem from PC Magazine's Interactive Reader Service at (212) 696-0360 or send a self-addressed, stamped envelope to Technical Editor, PC Magazine, One Park Ave., New York, NY 10016.

The only thing missing so far is the ability to rename subdirectories under DOS 2.x. It's not impossible: you just have to go back to the old DOS function call 17h and

use an extended File Control Block. Figure 4 shows how you can use DEBUG to create a RENDIR.COM program that will rename subdirectories (but not do restructuring) under DOS 2.0 and later. The first argument must be an existing subdirectory in your current directory. You cannot use any backslashes in either parameter. The error message is a beep. [Another full-fledged RENDIR.COM utility by John Dickinson is scheduled for an upcoming Programming/Utilities column—Ed.] —Charles Petzold

## SQUARE ROOTS IN DBASE REVISITED

In the November 12, 1985, Power User (PC Magazine, Volume 4 Number 23), a letter outlined a dBASE program for finding square roots. I may have missed something, but why didn't the writer simply use the "exponentiation" operator to find the square root (or any other root or power—including fractional)? For example:

```

N = 3
? N**1/2 (yields 1.73 as the square root)
N = 3.88888
? N**1/2 (yields 1.73205 as the square root)

```

Tony Long  
Schuylkill Haven, Pennsylvania

Part of the reason for including the SQRT.PRG identified above in Power User was that the program's origins were in Poscol. It thus served to illustrate the kind of cross-programming possible between dBASE and other programming languages.

Mr. Long did miss at least a little. For one thing, use of the exponentiation operators is limited to dBASE III; dBASE II does not have these useful extra operators. Thus, for users of the latter the only way to get square roots easily is through a program like SQRT.PRG. (A dBASE III version of this program was included in keeping with our policy of accommodating differences between the two dBASE programs whenever possible.)

For another thing, however, Mr. Long's example is wrong. To find a square root in dBASE III, you would normally use the program's SQRT (?) operator (?) is the number whose root you're seeking). You can also use the \*\* operator followed by .5 to produce the same result. However,

```

A>DEBUG
-A
XXXX:0100 CLD                ; Forward
XXXX:0101 MOV                ; Source string
XXXX:0104 MOV DI,126          ; Destination
XXXX:0107 MOV CX,1C           ; Number of bytes
XXXX:010A REP MOVSB           ; Move them
XXXX:010C MOV DX,11F          ; FCB Address
XXXX:010F MOV AH,17           ; Rename Call
XXXX:0111 INT 21              ; Call DOS
XXXX:0113 OR AL,AL            ; Check Error
XXXX:0115 JZ 11D              ; Exit if OK
XXXX:0117 MOV DL,7            ; Beep Code
XXXX:0119 MOV AH,2            ; Print Call
XXXX:011B INT 21              ; Call DOS
XXXX:011D INT 20              ; Exit
XXXX:011F
-E 11F FF 00 00 00 00 10
-N RENDIR.COM
-R -CX
-CX 0000
:26
-W
Writing 0026 bytes
-Q

```

Figure 4: You can use DEBUG to create RENDIR.COM, a program that renames subdirectories under DOS 2.0 and later. You don't have to type the semicolons and comments.

er, using the fraction  $\frac{1}{2}$  only gives you one-half the number stored in N, not its square root.—David Obregón

#### WORDSTAR AND EPSON ENHANCEMENTS

Getting true superscripts and subscripts to print on the Epson MX-80 under *WordStar* takes some work but is well worth it. To patch the WS.COM file, start by putting DEBUG in drive A: and a copy of the WS.COM file in drive B:. Type DEBUG B:WS.COM <Return>, and at the hyphen prompt type the following:

```
F 775 L4 03 1B 53 00<Return>
F 77A L4 03 1B 53 31<Return>
F 789 L2 01 1B<Return>
F 76B L4 03 1B 2D 31<Return>
F 770 L4 03 1B 2D 00<Return>
W <Return>
Q <Return>
```

The first two patches (lines 2 and 3) will let you use 'PT for superscripts and 'PV for subscripts. Unfortunately, with the MX-80, using 'PT or 'PV to toggle the script mode off still leaves the line height in script mode.

The patch in line 4 helps solve this problem by letting you use 'PE to send an escape code to the printer. In this case, the command is 'PET, which is the Epson code for turning off script mode. You also have to add 'PEH, the code for turning off double-strike. 'PT or 'PV after the super- or subscript is still necessary since *WordStar* treats this as a toggle that needs to be reset.

These patches do create one problem: If you use a super- or subscript on a line that contains underlining (PS), everything after that line is thrown into a double-strike mode. However, I found that if you use continuous underlining, this problem dis-

appears. The patches on lines 5 and 6 redefine 'PA and 'PN so that 'PA will turn on continuous underlining and 'PN will turn it off.

Some special print modes create minor problems, as well. Emphasized print has precedence over the script mode and the script mode will not turn on. Double-strike causes increased fuzziness each time the script mode is invoked. So, turn off emphasized and double-strike just before the script mode and then turn them on again just afterward.

When typing in the justified mode, you must be careful of one thing. Any line containing a superscript or subscript will be two columns short of the right margin when printed. This occurs because *WordStar* counts the extra H and T (used with the 'PE) as characters even though the printer treats them as commands and does not print them.

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## ■ POWER USER

This route to super- and subscripts may not be elegant, but with practice or a Pro-Key macro, it works fine.

Virginia Shovlin  
Mentor, Ohio

I tested this out on my Centronics GLP, which is (theoretically) 100 percent compatible with the IBM Graphics printer, and I found a few minor differences in operation. With the GLP, the 'PEH' after a super- or subscript is not necessary, making the commands a little neater. I also found that the super- or subscript would turn on during emphasized printing, though the print suffered from the same fuzziness as it does with double-strike. And with the 'PS' in the same line as 'PT' or 'PV' on the GLP, everything after that line was thrown into script mode rather than double-strike. Despite the differences in problems, though, the solutions remained the same.

Also, you can cut down on keystrokes, avoid confusing WordStar's column count, make the screen neater, and eliminate the possibility of accidentally typing a lowercase t or h simply by putting the Escape T Escape H sequence on one of WordStar's four user-defined print commands.—M. David Stone

### KEYBOARD SCAN CODES FROM TURBO

I've written a small procedure in Turbo Pascal to get keyboard scan codes using the BIOS Interrupt \$16 (hexadecimal). This is necessary for reading function keys or cursor movement keys. The demo program shows how to use it and prints out the character typed, the ASCII value of the character, and the keyboard scan code. When the ASCII code is zero, the scan code indicates an extended keyboard key, such as a function key. The extended key-

board codes are documented in the IBM PC Technical Reference manuals and Appendix G of the IBM BASIC manual (Appendix D in the manual for Version 3.0).

Andy J.S. Decepeida  
Canada, Toronto  
Ontario

Normally, Turbo Pascal reads whole lines of keyboard input terminated with a carriage return. It echoes the line to the screen as you type it. Andy's routine (shown in Figure 5) is one way to write Turbo programs that avoid the normal Turbo keyboard input procedures.

Another approach is shown in Figure 6. This is discussed in Appendix K of Borland International's Turbo Pascal, Version 3.0, reference manual, though it also works with Version 2. Reading from the KBD device gets unechoed and unbuffered keyboard input one character at a time. It



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Compresses to 1/16777216 space	✓	✓	✓	✓
Compresses to 1/33554432 space	✓	✓	✓	✓
Compresses to 1/67108864 space	✓	✓	✓	✓
Compresses to 1/134217728 space	✓	✓	✓	✓
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```

program scancode ;
var ch : char ;
    aacii, acan : byte ;

procedure getkb (var ch: char; var aacii, acan: byte) ;
type repack = record
    ax,bx,cx,dx,bp,si,di,es,flags : integer ;
end ;
var reg : repack ;

begin
    reg.ax := 0 ;
    intr ($16, reg) ;
    aacii := lo (reg.ax) ;
    acan := hi (reg.ax) ;
    ch := char (aacii) ;
end ;

begin
    repeat
        write ('Scan code demo (F18 to exit) --> ') ;
        getkb (ch, aacii, acan) ;
        writeln (ch, aacii: 4, acan: 4) ;
    until acan = 68 ;
end.

```

**Figure 5:** A small routine in Turbo Pascal to get keyboard scan codes and extended keyboard codes. Getting these codes is necessary if your program must interpret the function and cursor keys and distinguish between keys that produce the same ASCII code.

handles the extended keys by returning the extended key code when it's called a second time. DOS function calls do the same thing by returning an ASCII zero as the first byte. However, Turbo replaces that zero with an escape code (ASCII 27). Because the escape code can be generated by pressing the Esc key, you have to check for another key using the "keypressed" function before you fetch the extended key code. As you can see, it's definitely not as easy to use.

In cases where you have to differentiate between the PC's two Plus or two Minus keys (for instance), Andy's routine is also necessary. The ASCII codes are the same,

but the scan codes are different. Try out both routines to see the difference.

—Charles Petzold

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```

program readch ;
var ch, che : char ;

begin
    repeat
        write ('Read(ch) demo (C to exit) --> ') ;
        read (KBD, ch) ;
        if (ch = 427) and keypressed then begin
            read (KBD, che) ;
            writeln (ch, ord(ch): 4, ord(che): 4) ;
        end
        else writeln (ch, ord(ch): 4) ;
    until FALSE ;
end.

```

**Figure 6:** This program represents an alternative approach to getting extended keyboard codes, using the Turbo Pascal "read" procedure. An ASCII escape code indicates that an extended code may be waiting.

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■ EDITED BY PAUL SOMERSON

# USER-TO-USER



*PC Magazine's readers share their favorite tricks for getting the most horsepower out of DOS, BASIC, and their systems in general.*

## GLOBAL FILE CLEANING

It's easy to fill up a hard disk with files that may no longer be needed. Since DOS doesn't let users delete files globally across subdirectories, I developed a utility called SCLEAN.COM (see Figure 1) that will search an entire hard disk for specific filenames (or wildcards) and allow me to erase or retain files selectively.

The syntax for using this utility is:

SCLEAN [d:] filename

SCLEAN will begin its search in the root directory and then scan any subdirectories that exist. Whenever a filename is found that matches the one you specify, SCLEAN will print out the filename and its path and then wait for you to enter a Y or an N. Choosing a Y will automatically delete the match, while choosing an N will leave it alone. If any other key is pressed, the question will be repeated.

With some simple changes, you can adapt the utility so it erases without showing you the matches one by one and without waiting for you to confirm each deletion, as though you typed in a true global erase command. I use this second version to delete any backup files I might create. You can create this second version by making three changes: Substitute a new name (such as GCLEAN.COM) in lines 230 and 270, change the Z# = 34390! in line 150 to Z# = 34205! and change lines 280 and 370 as shown in Figure 2. But be careful when using this, since it won't stop to verify your erase instructions.

Michael F. Roberts  
Snohomish, Washington

```

100 ' Program for creating SCLEAN.COM -- Michael F. Roberts
110 PRINT "Checking DATA statements; please wait..."
120 FOR B=1 TO 20:FOR C=1 TO 17:READ AS:IF C<17 THEN 140
130 Z#=Z#+VAL(AS)
140 NEXT:NEXT
150 IF Z#=34390! THEN RESTORE:GOTO 170
160 PRINT "CHECKSUM ERROR -- CHECK TYPING AND REDO!":END
170 FOR B=1 TO 20:FOR C=1 TO 16:READ AS:TTL=TTL+VAL("6H"+AS)
180 NEXT
190 READ S:IF S=TTL THEN 220
200 PRINT "DATA ERROR IN LINE":B*10+270
210 PRINT "CHECK FIGURES AND REDO":END
220 TTL=0:NEXT:RESTORE
230 OPEN "SCLEAN.COM" AS #1 LEN=1:FIELD #1,1 AS DS
240 FOR B=1 TO 20:FOR C=1 TO 16
250 READ AS:LSET DS=CHR$(VAL("6H"+AS))
260 PUT #1:NEXT:READ DUMMYS:NEXT:CLOSE
270 PRINT "SCLEAN.COM CREATED"
280 DATA EB,1F,90,44,65,6C,65,74,65,20,00,20,28,59,2F,4E,1323
290 DATA 29,3A,20,20,00,0A,0D,00,2A,2E,2A,00,00,00,00,3A,374
300 DATA 00,BF,00,00,0B,1D,32,FF,C6,41,01,00,FC,47,0B,CB,1721
310 DATA B0,20,F3,AE,C3,25,00,3D,3A,75,07,0A,45,FF,47,EB,2028
320 DATA 00,90,B4,19,CD,21,4F,04,41,A2,1E,01,89,3E,1C,01,1164
330 DATA BA,1E,01,52,00,C2,02,52,E8,02,00,CD,20,55,0B,EC,1636
340 DATA 83,EC,73,8B,D5,83,EA,71,B4,1A,CD,21,8B,1E,1C,01,1954
350 DATA E8,0B,DD,03,C9,B4,4E,CD,21,72,43,BE,03,01,E8,A8,1894
360 DATA 00,0B,DD,83,EB,53,E8,75,00,0B,F2,E8,9B,00,BE,0B,2127
370 DATA 01,E8,95,00,B4,01,CD,21,8B,D8,BE,15,01,E8,09,00,1737
380 DATA 00,E3,DF,00,FB,59,74,07,00,FB,4E,74,0B,EB,CC,0B,2331
390 DATA D5,83,EA,00,B4,41,CD,21,B4,4F,CD,21,73,BD,BB,18,2137
400 DATA 01,E8,3A,00,B9,10,00,B4,4E,CD,21,72,2B,00,7E,AD,1572
410 DATA 2E,74,1F,00,7E,AA,10,75,19,BB,1B,01,E8,1F,00,52,1329
420 DATA 0B,D5,83,EA,53,52,E8,74,FF,0B,D5,83,EA,71,B4,1A,2521
430 DATA CD,21,B4,4F,CD,21,73,D5,0B,E5,5D,C2,04,00,0B,FD,2114
440 DATA 83,EF,00,0B,FB,7D,0B,76,06,E8,15,00,C6,05,0C,0B,76,1856
450 DATA 04,E8,0C,00,C6,05,5C,47,0B,F3,E8,03,00,88,05,C3,1567
460 DATA AC,0A,C0,74,03,AA,EB,F8,C3,B4,02,0A,14,0A,D2,74,2017
470 DATA 05,CD,21,46,EB,F5,C3,00,00,00,00,00,00,00,00,00,988

```

**Figure 1:** SCLEAN.BAS program to create SCLEAN.COM utility that will allow you to make selective global file deletions across subdirectories. This version will ask for file-by-file delete verifications; to adapt it to erase globally without verification, make the three changes described in the text.



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CIRCLE 119 ON READER SERVICE CARD

## ■ USER-TO-USER

```

280 DATA EB,1F,90,44,65,6C,65,74,65,20,00,0D,0A,00,2F,4E,1185
370 DATA 01,E8,95,00,04,01,EB,17,90,90,BE,15,01,E8,89,00,1690

```

**Figure 2:** For a global eraser, substitute these two DATA statements in Figure 1, change Z# in line 150 to 34205!, and change "SCLEAN.COM" in lines 230 and 270 to "GLEAN.COM".

A valuable utility indeed. The SCLEAN.COM version is a whole lot safer than GCLEAN.COM, since GCLEAN \*.\* could wipe out your entire hard disk (including the GCLEAN.COM file that did the damage) except for the subdirectory names themselves. If you do use GCLEAN, unless you're exceedingly careful, create batch files that do the actual work and prevent errant keystrokes from wreaking havoc. For instance, a batch file called BAK.BAT to delete .BAK files everywhere on your hard disk would contain the line

```
GCLEAN *.BAK
```

**BATCH LINE SKIPPER**

The DOS 3.1 COMMAND.COM patch to skip a line in a batch file with the ECHO + space + space construction (User-to-User, Volume 4 Number 24) is useful only when running a batch file on a system that has the patched COMMAND.COM.

Developers and anyone else who distributes batch files need a way to skip lines in batch files on all systems. With ECHO OFF, the construction ECHO H (^H means hold down the Ctrl key and hit the H key.) will skip a line using both DOS 2.1 and 3.1. To demonstrate this, create a batch file called LINE.BAT with these lines

```

ECHO OFF
ECHO This is line 1.
ECHO ^H
ECHO This is line 3.

```

To insert the Ctrl-H you will need an editor or word processor that is able to embed control characters. This can be done with WordStar by holding down the Ctrl key and typing PH. Using EDLIN this can be done by holding down the Ctrl key and typing VH.

Richard A. Secor  
Watertown, Massachusetts

The extended ASCII character set offers three blanks—CHR\$(0), CHR\$(32), and

CHR\$(255). CHR\$(32) is the conventional between-word space, while CHR\$(0) is a null and CHR\$(255) is a high-bit space. Following ECHO with either a CHR\$(0) or a CHR\$(255) will skip a line. Two other ways to create these line skippers are in BASIC and in DEBUG. WordStar lets you make the ECHO + CHR\$(255) (but not the CHR\$(0)) by holding down the Alt key, typing 255 on the number pad (not the top row), and then releasing the Alt key—if you do this, a ^ will appear. If you use DEBUG, type in the whole file using your word processor (or even the DOS COPY CON: facility) but put a single dummy character where the CHR\$(0) or CHR\$(255) goes. Then get into DEBUG and replace the dummy character with either a 0 for CHR\$(0) or an FF for CHR\$(255), or just follow ECHO with a period—and no intervening space.

**BASIC WINDOW**

Since BASIC doesn't provide a convenient way to scroll part of a text screen, I wrote my own assembly language subroutine to do the trick (Figure 3). The routine can also rapidly blank out a window.

The routine loads into the array SCRL. Five parameters are passed to it—whether the window should scroll up or down and the four corners of the window. They must be passed in the order shown.

Hubert Bormann  
Lillian, Alabama

While this program doesn't check for numerical input errors and scrolls only a line at a time, it does work as advertised. One of its better uses is to blank an area of the screen rapidly without having to print a series of individual CHR\$(32) strings.

**REMLESS REMs**

Well-chosen remarks within a batch file can be very valuable in prompting a user to swap disks or to display a title or logo. However, it would be nice to eliminate the actual word REM from the display.

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CIRCLE 107 ON READER SERVICE CARD

## ■ USER-TO-USER

```

100 'SCROLL.BAS -- by Hubert Borrmann
110 DEFINT A-Z:SCREEN 0:WIDTH 80:CLS:DIM SCRL$(34)
120 FOR X=0 TO 33:READ Z$:SCRL(X)=VAL("&H"+Z$):NEXT
130 PRINT "Want window cleared (Y/N)?";
140 I$=INKEY$:IF I$="" THEN 140 ELSE CLS
150 IF I$="X" OR I$="Y" THEN SCRL(29)=&HB700
160 FOR X=65 TO 87:PRINT STRING$(80,X):NEXT
170 LOCATE 25,23:PRINT "Up or down (U/D) -- or Esc to end:";
180 I$=INKEY$:IF I$="" THEN 180 ELSE IF I$=CHR$(27) THEN END
190 IF INSTR("Uudd",I$)=0 THEN BEEP:GOTO 180 ELSE GOSUB 260
200 LOCATE 25,30:INPUT "Enter top row: ";TOP:GOSUB 260
210 LOCATE 25,30:INPUT "Enter bottom row: ";BOT:GOSUB 260
220 LOCATE 25,30:INPUT "Enter left column: ";LEF:GOSUB 260
230 LOCATE 25,30:INPUT "Enter right column: ";RHT
240 DEF SEG:SCROLL = VARPTR(SCRL(0))
250 CALL SCROLL (UD$,TOP,BOT,LEF,RHT):GOSUB 260:GOTO 170
260 LOCATE 25,23:PRINT STRING$(40,32);:RETURN
270 DATA 8B55,8BEC,8B5E,178A,5EB8,8A98,8B0F
280 DATA 8A5E,378A,5EB8,8ABC,FE2F,FECA,FECD
290 DATA FECE,8BCD,8E76,6CB8,8A81,8066,FC88
300 DATA 7455,888A,75FC,8574,87B4,83EB,B498
310 DATA B086,B701,C087,5D18,8ACA,8080

```

Figure 3: SCROLL.BAS routine for scrolling or blanking a window in BASIC.

This is simple to do. The trick is to place a string of backspaces (CHR\$(8)) at the beginning of the remark line. You can't do this when using the DOS COPY CON: batch creation method, since DOS uses the Backspace key for making corrections. But any word processor that allows embedded control codes makes it easy.

In the following REMLESS.BAT example, the first remark will be preceded by a REM, while the second won't (Each backspace here appears as a lower-case h.)

```

CLS
REM this is a remark
REMHhthis is a REMless remark

```

You can also use this technique along with *SideKick*'s ability to enter and edit the upper 128 ASCII graphics symbols to create attractive titles.

Ethan Winer  
East Norwalk, Connecticut

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## ■ USER-TO-USER

While this will eliminate the problem of displaying REMs, it's just as easy to start your batch files with ECHO OFF and then ECHO comments. If you have a word processor such as SideKick or WordStar that lets you embed control characters, you can create each backspace in REMLESS.BAT by typing Ctrl-PH (they'll show up as 'Hs). Otherwise, run the REMLESS.BAS program in Figure 4.

```
100 ' REMLESS.BAS -- creates REMLESS.BAT test batchfile
110 OPEN "remless.bat" FOR OUTPUT AS #1
120 PRINT #1,"CLS"
130 PRINT #1,"REM this is a remark"
140 PRINT #1,"REM";STRING$(3,8);"this is a REMless remark"
150 CLOSE:END
```

Figure 4: Program to create REMLESS.BAT batch file to illustrate technique of preventing REMs from displaying in batch files.

## UNDOCUMENTATION

While a hard disk's tree-structured directory system is very helpful, it can be very discouraging to get deep into a directory that has many subdirectories and then try to back out to the previous one.

If you are logged into a subdirectory called \D1\D2\D3\D4\D5 and you want to get to \D1\D2\D3\D4, you could type

CD \D1\D2\D3\D4

But there is an undocumented trick that will step you back one subdirectory at a time—just type


CD ..

Randy Dudley  
Sevierville, Tennessee

This technique has been written about so much and used for so long that many users know about it already and probably think it's in the current documentation, but it's not. The DOS manual does say that you


can see what files are in the parent (higher) directory by typing DIR.. but doesn't mention the use of the double dot in moving upward through your subdirectories toward the root.

IBM pictures its tree-structured directories upside-down, with the roots at the top and the branches spreading down. When IBM uses the term downward, it means away from the root; upward means toward the root. To move downward, type CD and the name of the next lower subdi-



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## PRODUCTIVITY

### ■ USER-TO-USER

■ IBM pictures its tree-structured directories upside-down, with the roots at the top.

rectory—without a backslash. To move upward, type

CD ..

(This works only until you reach the level directly below the root directory—try it in the root and all you'll get is an "Invalid directory" message.) So if you're logged into \D1\D2\D3 and want to move to \D1\D2\D3\D4, just type

CD D4

You couldn't get to the same place with

CD \D4

since DOS would think you wanted to get to a directory called \D4 that was just one level down from the root. The reason for the confusion is that in the above case you're really not trying to get to a subdirectory called \D4; the full name of the desired subdirectory is \D1\D2\D3\D4. You need the full path before every subdirectory. But to get from \D1\D2\D3 to \D1\D2\D3\D4 all you type is

CD D4

Got it? Lots of users don't get it, because IBM's manuals didn't exactly make it easy. Once you read this explanation carefully and try it a few times you'll catch on, but for many novice users this is an inscrutable mess that prevents them from getting true organizational power out of their hard disks.

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■ EDITED BY CHARLES PETZOLD

# PC TUTOR



*PC Tutor answers your questions on everything from programming and operating systems to hardware and applications software.*

## RESIDENT WARS

Almost every issue of *PC Magazine* contains yet another neat resident program I would like to use. I also use resident programs, such as *SideKick* and *ProKey*. Most of these resident programs examine keystrokes waiting for the special one that puts them into action. My first question is: How do they manage not to get in each other's way? Is there a limit to the number of such programs I can use at one time? Is there a preferred sequence to follow in loading these programs initially? Does having so many programs examining my keystrokes slow down processing?

My second question concerns a disk full of BASIC programs that I would like to print with as little effort as possible. If the programs were in ASCII format, I could just execute

PRINT \*.BAS

But they are not in ASCII. What's a smart way to print these files other than loading and listing them one at a time?

Michael Trombetta  
Manhasset, New York

*To take your first question first: Sometimes loading up a bunch of resident programs does create problems. Some resident programs are polite and some are not. Frankly, experimentation is the best way to find the crabby ones and what is the best loading sequence. (Often it doesn't matter.) Sometimes the program documentation may recommend loading a given resident program first or last, but other than that, you're on your own.*

*I have 10 resident programs that load everytime I boot up. (And if you think that's a lot, you should see Craig Stark's AUTOEXEC.BAT—it's one of the largest files on his hard disk!) Adding a new one is always an adventure—I recently wrote a "print screen to file" resident program that managed to interact with the DOS PRINT command in such a way that I could do a directory on a diskette drive with an open door without getting the "Abort, Retry, Ignore?" message. That program needs work.*

Many resident programs are called into action by what is known as a "magic keystroke." To explain just how they work, I will have to start with the basics. Every time that you press a key on the keyboard, you initiate a hardware interrupt to the 8088 microprocessor called Interrupt 9. This interrupt forces the 8088 to execute a routine whose address is located in the 4 bytes at memory location 0000:0024 in lower memory. This is called the Interrupt 9 vector address.

When you first boot up, this vector address points to a routine in the ROM BIOS that decodes the keystrokes into ASCII codes. When a "magic keystroke" resident program loads, it gets this vector address from memory, saves it, and then substitutes an address that points to its own code. Thereafter, pressing a key causes the resident program to check the keystroke first. If it's not the magic keystroke, the program then branches to the address it saved when it loaded. (Usually the magic keystroke is something the ROM BIOS would ignore anyway.)

Each resident program that loads does the same thing. In theory, this is all nice and neat. The result is a long chain of resident programs, each in turn checking a struck key. The resident program loaded last has first divvies on your keystrokes. It then passes control to the resident program loaded next to last, and so on back. The ROM BIOS is last in line to get the keystroke. The only real limit to the number of such programs is memory size. Some speed degradation results, but in most cases it is not enough to be noticeable.

In real life, programs are not so neatly arranged, however, and resident programs often interact with each other in undesirable ways. Some do more than just check keystrokes. For instance, *SideKick* uses the timer interrupt to check if any other program has changed the keyboard vector address. If so, it saves that address and puts its own address back in the vector area so it always has first grabs on keystrokes. If you had another resident program that used the same trick, it and *SideKick* would be grabbing the interrupt vector back and forth 18 times a second.

You may also have situations where different resident programs use the same magic keystroke. [This is why in our Programming/Utilities column we always allow users to select their own "trigger" key(s)—Ed.] In that case, the last one to execute would work, and the other would not (unless, of course, the other one worked like *SideKick*).

Interrupt 9 is not the only vector address that resident programs can intercept, however. You can see which inter-

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## PRODUCTIVITY

### ■ PC TUTOR

rupts are intercepted by resident programs by loading DEBUG and displaying the first half of the vector area by entering

D 0:0 L 100

Then, load the resident program and look at that area again. Each interrupt (beginning at zero) uses 4 bytes. You can get a listing of all the interrupt functions in the PC Technical Reference manuals or in the comprehensive Peter Norton's Programmer's Guide to the IBM PC.

Obviously, the more interrupts that resident programs intercept and the more things they do with them, the greater the possibility of creating conflicts. It gets to be like a war zone in memory. Unlike a true multitasking system, DOS has no real control over these resident programs, so strange things can happen.

For example, if you have ANSI.SYS loaded and load a version of SideKick prior to 1.5, you'll find that a simple CLS command wipes out the border on a color/graphics display. The border is normally preserved on a CLS when ANSI.SYS is used. It took me a long time to figure out what caused the problem (and it wasn't really SideKick's fault).

In general, I think the ability of DOS to accommodate resident programs is one of the neatest features of the operating system. But I'd really like to see commercial resident programs document which interrupts they intercept, and what they do with them. That would allow users to mediate the resident wars that sometimes erupt in their systems.

### BASIC CONVERSIONS

Your second question concerned printing out BASIC files with a minimum of effort. When you save a BASIC program, it is normally stored on disk in a tokenized format—that is, all the keywords are replaced with 1-byte numbers to save space. You can save a BASIC program in ASCII format by following the filename in the SAVE command with a comma and A. The ASCII files take up more space on disk, but you can use TYPE and PRINT on them.

Since you've got a whole disk full of such programs, let me show you how to use redirection of standard output to make a file that the BASIC interpreter can read with redirection of standard input to con-

vert all your BASIC files to ASCII format.

First, you create a small file called LOADSAVE.BAT consisting of the following two lines:

```
ECHO LOAD "%1" >>CONVERT
ECHO SAVE "%1",A >>CONVERT
```

The double angle bracket means append the text following the ECHO command to the file CONVERT. The "text" written into CONVERT will consist of just BASIC commands.

Next, create a two-line batch file called MAKEFILE.BAT that consists of the following two lines:

```
DEL CONVERT
FOR %* IN (*.BAS) DO COMMAND /C LOADSAVE %*
```

The DEL command gets rid of any existing CONVERT file so you start from scratch. When you run MAKEFILE.BAT on the DOS command level, the FOR command will execute LOADSAVE.BAT for every BASIC file on your disk (or hard disk sub-directory), passing to it a parameter with the name of the batch file. LOADSAVE.BAT will create a file called CONVERT that contains BASIC commands to load each file and save it with the ASCII option.

After you run MAKEFILE.BAT to create the CONVERT, all you have to do is execute the command

#### BASICA <CONVERT

BASICA will load all your BASIC files and save them in ASCII format. Then you can use the PRINT command.

If you don't want to convert them to ASCII format but just want to print them all out, you can do something similar by creating the following two files. First, LOADLIST.BAT

```
ECHO LOAD "%1" >>LISTALL
ECHO LIST %1 >>LISTALL
ECHO PRINT CHR$(12) >>LISTALL
```

#### Second, MAKEFILE.BAT

```
DEL LISTALL
FOR %* IN (*.BAS) DO COMMAND /C LOADLIST %*
```

Run MAKEFILE.BAT to create LISTALL and then execute

#### BASICA <LISTALL

Notice that I've included a printer form feed using CHR\$(12) so each BASIC file listing will start on a new page.

I can remember when DOS 2.0 first came out and people took a look at the FOR command, redirection of standard I/O, loading secondary command processors (COMMAND(C), and other features, and people didn't know what to do with these facilities. Obviously, putting them all together has more potential for automating PC tasks than was first evident.

#### TIME-OUT FOR PRINTERS

I recently bought a laser printer that's been giving me problems with some programs, including commands on the DOS command level that redirect output to it. I keep getting a "Write fault error writing device

■ The ability of DOS to accommodate resident programs is one of its neatest features.

LPT1. Abort, Retry, Ignore?" For small files, I can keep typing R, but with some programs, this obviously doesn't work well. The printer manufacturer suggests that the problem lies in the printer time-out value stored in the ROM BIOS.

Is there a way to change the printer time-out value? I have checked over the ROM BIOS listings in the Technical Reference manual with no success.

Jennifer S. Davis

I agree with the manufacturer: The problem sounds like an insufficient time-out value. Before the ROM BIOS attempts to print something on a printer, it first checks to see if the printer is ready to receive another character. If not, it goes into a loop continually checking the printer status. To avoid permanently hanging during this check procedure, the BIOS counts down using a time-out value. It will only check for the duration indicated by the time-out value. At the end of this time, if the printer is still not ready and you're printing from DOS, you'll be greeted with the infamous "Abort, Retry, Ignore?" message.

On the early PCs, time-outs errors

sometimes occurred during the form-feeds of the IBM Matrix Printer. For this reason, DOS 1.1 (and later versions) increased the time-out value. The printer time-out values are located in the BIOS data area, beginning at hexadecimal address 0040:0078. This area contains four byte values for the four parallel printers that the BIOS (in theory) supports. At boot-up, the current PC ROM BIOS sets the time-out values to 20 (14 hexadecimal), the same value that DOS 1.1 used.

You can experiment with different time-out values by using DEBUG. To double the LPT1 time-out value to 40 (28 hex), for instance, just get into DEBUG and enter the following commands:

```
E 0040:0078 28
Q
```

Be careful when you enter the memory address: If you get it wrong, you may write over something else. Once you find a value that works well (you don't want to make it too large, since that will cause a long hang if the printer is really off-line), you can add a line to your AUTOEXEC.BAT file to change it everytime you boot up. Just put the two lines shown above into a file called CHGTIME, and add the following line to your AUTOEXEC.BAT:

```
DEBUG <CHGTIME
```

If using DEBUG gives you the willies, you can do something similar in BASIC. The BASIC program (which you might call INCTIME.BAS) is

```
10 DEF SEG=&H40
20 POKE &H7B,40
```

The 40 here (the same as hexadecimal 28) is a good value to start with for experimenting. After you find a good value, you add the line

```
30 SYSTEM
```

to INCTIME.BAS and enter the line

```
BASICA INCTIME
```

to your AUTOEXEC.BAT.

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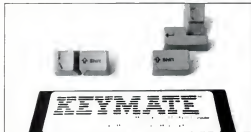
# REVIEWS IN BRIEF

## KEYMATE: An Upgrade for the PC Keyboard

BY VICTORIA DANOFF

IBM PC and XT users who stubbornly refuse to buy a \$200-plus replacement for the much-maligned IBM PC keyboard can now take solace in KEYMATE, a software and hardware system that upgrades PC and XT keyboards to the standard IBM Selectric configuration in a matter of minutes. For about one-third

minutes. Even computer novices who have never tinkered with their machines should have no problems because everything is clearly detailed in the documentation. To replace the keys, you first turn off the computer and unplug the keyboard cable from the rear of the system unit. Then, using a screwdriver, you gently pry off the old keys and press in the new ones. The man-



the cost of replacement keyboards such as the Key Tronic 5150, you can now have your cake and eat it, too—KEYMATE offers easier typing without sacrificing the familiar feel and the “click” of the IBM keyboard keys.

KEYMATE comes with five gray replacement keys and a program called KEYMATE.COM. Used together, the two elements of the system place a wider left-hand Shift key and an L-shaped Enter key in the standard Selectric typewriter locations so that you won't have to stretch as far to reach them. The other three replacement keys are the Tilde (~), the Path (|), and the right Shift. All KEYMATE keys have wide, sculptured surfaces, making typing easier.

The entire installation process, both software and hardware, can take as little as 10

minutes. Even computer novices who have never tinkered with their machines should have no problems because everything is clearly detailed in the documentation. To replace the keys, you first turn off the computer and unplug the keyboard cable from the rear of the system unit. Then, using a screwdriver, you gently pry off the old keys and press in the new ones. The manual gives step-by-step, illustrated instructions for removing and inserting both sets of keys. Overzealous do-it-yourselfers may be tempted to forgo reading the documentation first, hastily grabbing their screwdrivers and yanking the IBM keys off as soon as they spy the brand-new gray keys in the KEYMATE box. Be forewarned: It will be more difficult to do the software installation if the new keys are in place.

KEYMATE.COM software is a RAM-resident program that you add to your AUTOEXEC.BAT file in order to reconfigure your keyboard each time the system is booted up. If you are not currently using an AUTOEXEC.BAT file, KEYMATE has already created one for you. You simply add it and KEYMATE.COM to your working copy of DOS on your floppy disk system or to the root

directory of your hard disk.

KEYMATE will not work with certain programs, including SAMNA Word, XyWrite II Plus, Leading Edge Word Processor, and programs like them, because such software takes control of the keyboard away from DOS. If KEYMATE is in operation when one of these word processors is loaded, the keyboard will revert to its original IBM configuration. As soon as you quit the program, though, KEYMATE becomes operational again. Another hitch is that, unfortunately, the KEYMATE system will work with only IBM computers and not with compatibles such as the Compaq.

Habits are hard to break, so it was awkward at first trying to readjust to the Selectric-like keyboard layout. I kept hitting the Path for the left Shift and the Tilde for Enter, for example. But I can adjust to anything—after all, I did manage to adjust to the IBM PC key layout, didn't I?

The KEYMATE program is

not copy protected, but then it really doesn't need to be. While you can make unlimited copies of the program, you're always limited to one machine at a time because there is only one set of KEYMATE keys.

The documentation clearly outlines the very easy procedures for installing the software with all possible hardware and software configurations. The 24-page manual was typeset and sized to match the IBM Guide to Operations and the DOS manual; it will fit nicely into either one for future reference.

KEYMATE is a good value. Anyone familiar with the Selectric typewriter layout will instantly appreciate the changes KEYMATE imposes upon the IBM PC keyboard. ■

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## μLYNX: Pointing with a Ball? Yes, a Ball!

BY  
G. HEATHER LUCHAK  
AND GERARD KUNKEL

For those of you who used to hang out in video arcades, the trackball brings back memories of dropping quarter after quarter for a few moments of electronic football. At least that's what we thought of when we first heard of the μLYNX (pronounced *microLYNX*) cursor-control device from Disc Instruments. To our dismay, the μLYNX proved to be a useful tool, not the toy we'd hoped to play with all day. In fact, it proved to be highly productive for real tasks.

Don't count out this trackball for spreadsheets, word processing, and graphics. The μLYNX replaces your keyboard's cursor movement keys with a trackball and three user-programmable function keys. There are preprogrammed key definitions for programs like 1-2-3, SideKick, WordStar, and PC Paintbrush (the last of which is included with the device), and you may easily define your own character instructions for each of the three keys.

For instance, we used the μLYNX with WordStar to write this review and assigned our three most-used func-

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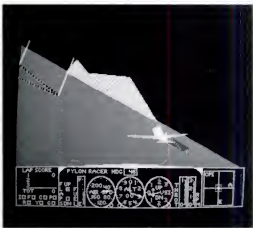
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Genicom 5010 Laser Printer, Genicom Corp.

is capable of printing documents at a resolution of 300 by 300 dots per inch and can implement advanced page composition languages such as Adobe PostScript and Xerox Interpress. User-replaceable personality cartridge modules currently available for the 5010 allow it to emulate the IBM Graphics Printer, the Diablo 630, and the Hewlett-Packard LaserJet protocols. The 5010 also accepts font cartridges; these will give it a range of 1,500 different fonts and will be available in the near future.

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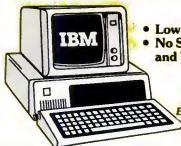
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# THE C AROUND US



*Some 75 percent of the new commercial programs for the IBM PC are written in C. These two books show how to apply C to business situations and build macros for common tasks.*

C is quickly becoming my favorite programming language, and I'm not the only one who is enthusiastic about it. About 75 percent of the new commercial programs for the IBM PC are being written in C. The language is clean, concise, flexible, portable, and efficient; it combines the structure of Pascal with the power and freedom of assembly language. C was developed in the early 1970s at Bell Labs for use on the UNIX operating system, but it's almost equally at home running under DOS. Here are two new books that may help programmers make the most of this powerful language.

## BECOMING A C PROFESSIONAL

*Variations in C*, by Steve Schustack, is an attractively produced book with a variety of typefaces and designs that has come to be characteristic of Microsoft Press books. I particularly like the little "Comment" and "Caution" boxes that adorn the text like screen pop-ups.

Yet it's not just the classy page layouts that make this a good book. Most of all it's Schustack's lively and lucid style and his infectious enthusiasm about C. I found it difficult to stay put while reading this book because it kept giving me ideas for C code that I immediately wanted to try out.

*Variations in C* is aimed at the experienced programmer, preferably one skilled in another structured language. The examples and discussion are based on (but not limited to) the Microsoft C Compiler, Version 3.0. (With Microsoft's clout, it has a good chance of becoming something of a PC standard.)

Because of its intended audience, *Variations in C* quickly goes through familiar material (like flow of control) and spends a greater amount of time on topics more peculiar to C. There's a nice healthy chapter on the preprocessor and another one on variable scope.

The central section of the book shows the complete construction of a large order-entry program with full-screen fill-in menus. Illustrating a large application is not always the best way to approach language instruction, but programmers involved in business applications of C may find much of value in this code. A com-

panion disk that includes the program source code is available for \$12.95.

*Variations in C* starts off with a bang, but toward the end it doesn't really live up to its promise of showing advanced techniques of C programming. It almost seems as if Schustack was exhausted after writing the large order-entry program and didn't have much strength to continue.

Real-life programming for the IBM PC has been characterized by extensive direct hardware control, but Schustack doesn't get close to the hardware at all. He uses ANSI control sequences for the order-entry program, talks about BIOS control of the display without really showing how it's done, and then promises to show later how the screen can be directly accessed with "far" pointers. Unfortunately, he never gets around to this last topic, which has value beyond display control.

One warning—if you get the Microsoft C Compiler, do not treat this book as a substitute for the compiler manual. The Microsoft manual is very well done and often addresses topics that no one else bothers with, such as writing functions with a variable number of arguments and packing structures so integers don't start on even address boundaries. But Schustack's book is a good companion to the Microsoft manual, particularly for programmers who must apply C to business applications. A second volume that covers the really advanced stuff would be most welcome.

**CODE, CODE, CODE** Often the best way to learn the techniques and tricks of a new programming language is to study lit-

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Cover Price: \$18.95  
ISBN: 0-07-881110-4

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## ■ BOOK REVIEW

the nuggets of existing code. Kris Jamsa's *The C Library* has so much C code that you can go on for pages and pages without encountering much normal text. It's almost like Jamsa did a PRINT \*,\* on his C sub-directory.

Like *Variations in C*, this is not a beginners book, and it is not the author's intention to teach the rudiments of C in this book. His 35 pages of syntax charts in the first chapter serve as enough reference material. Instead he covers C as it applies to common, low-level tasks (such as string manipulation and sorting) by illustrating over 125 functions introduced by good discussions and simple but helpful diagrams. Jamsa makes available a \$29.95 MS-DOS disk that has all the procedures in the book, and more.

The functions are shown in a uniform format with extensive and detailed comments, including a pseudo-code summary of the workings of the code. At times, for

instance, in his procedure to copy one string to another, the pseudo code is longer than the C code. The organization is methodical and well thought out.

*The C Library* gets started with simple macros. Jamsa builds on the macros to create some simple functions, then builds on the simple functions to create more-complex ones, and finally puts them all together for some useful UNIX-like utility programs. These include a DIFF program that compares two text files and displays the lines that are different, a file encryption program, and a program to insert blanks in front of each line of a file so that you can print out the file with a wide margin for notebook punch holes.

One advantage of Jamsa's approach is that it lets him spend an entire chapter on recursion, for example, and actually illustrate the technique—which involves a function calling itself—with eight recursive functions. There's a chapter on sort-

ing and another on writing "filter" programs in C.

*The C Library* can be used by several types of people. First, if the C compiler you're using has a weak library, this is an ideal source for beefing it up. Second, even if you have no need for some of the basic functions of your C compiler (for instance, if your C library already contains functions that copy, concatenate, search, and compare strings), the techniques for doing simple low-level tasks are valuable regardless.

Finally, think of Jamsa's routines as pieces of a puzzle that can be put together in thousands of different ways. He's shown you a few solutions, and now the rest is up to you. *The C Library* is ultimately a book to expand on and have fun with. ■

Charles Petzold is a contributing editor of PC Magazine.

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# COMING UP

**ALTERNATIVE OPERATING ENVIRONMENTS** Finally, viable ways to get around the familiar but frustrating DOS command prompt are available. Alternative operating environments are more than just pretty faces; they surround DOS with a shell, turning your display into a menu-oriented desktop for selecting and running PC applications. Some of these systems allow switching, windowing, cut-and-paste operations, and multitasking, and some include their own versions of pop-up desktop utilities. *PC Magazine* compares the power and value of four top contenders: IBM's *TopView*, Microsoft *Windows*, Digital Research's *GEM Desktop*, and Quarterdeck's *DESQview*.

**HIGH-PERFORMANCE COMPATIBLES** As long as computer manufacturers continue to produce high-performance machines that rival the IBM PC AT, *PC Magazine* will keep on benchmarking them. Jon Pepper, Frank Derfler, Winn Rosch, and Jared Taylor torture-test the AT&T 6300 PLUS, Texas Instruments Business Pro, Zenith Z-158, Basic Time BT/AT, Victor VPC, HP Vectra, Sperry PC/IT, and PC's Limited AT.

**TAX PREPARATION PROGRAMS** April 15th isn't too far away, but you don't have to dread the big day. *PC Magazine* looks at four tax preparation programs that will make tax time easier for you. The packages are representative of what's available, ranging from a user-supported program to a \$1,650, 21-disk package aimed at professional preparers.

**SPECIAL REPORT: MORE WORD PROCESSING** Try as we might, we couldn't cram all the word processing categories and programs into one blockbuster issue (Volume 5 Number 2). The low-down on word processing power continues with reviews of scientific word processors, word processing portions of integrated packages, and word processors that run under alternative operating environments.

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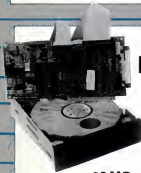
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Soft scrolling, panning and windowing		✓
Optional Clock Calendar	✓	
Supports a light pen interface	✓	✓
Includes PC Accelerator™, STB's exclusive utility program which provides up to 10 disk emulators, 3 print spoolers and utilizes available system memory; PC-AT memory above one megabyte and EMS memory (Lotus™ Intel™ Microsoft™) through STB's Memory Companion PC™ board	✓	
Which board sells for 40% less than the other comparable product?	✓	

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